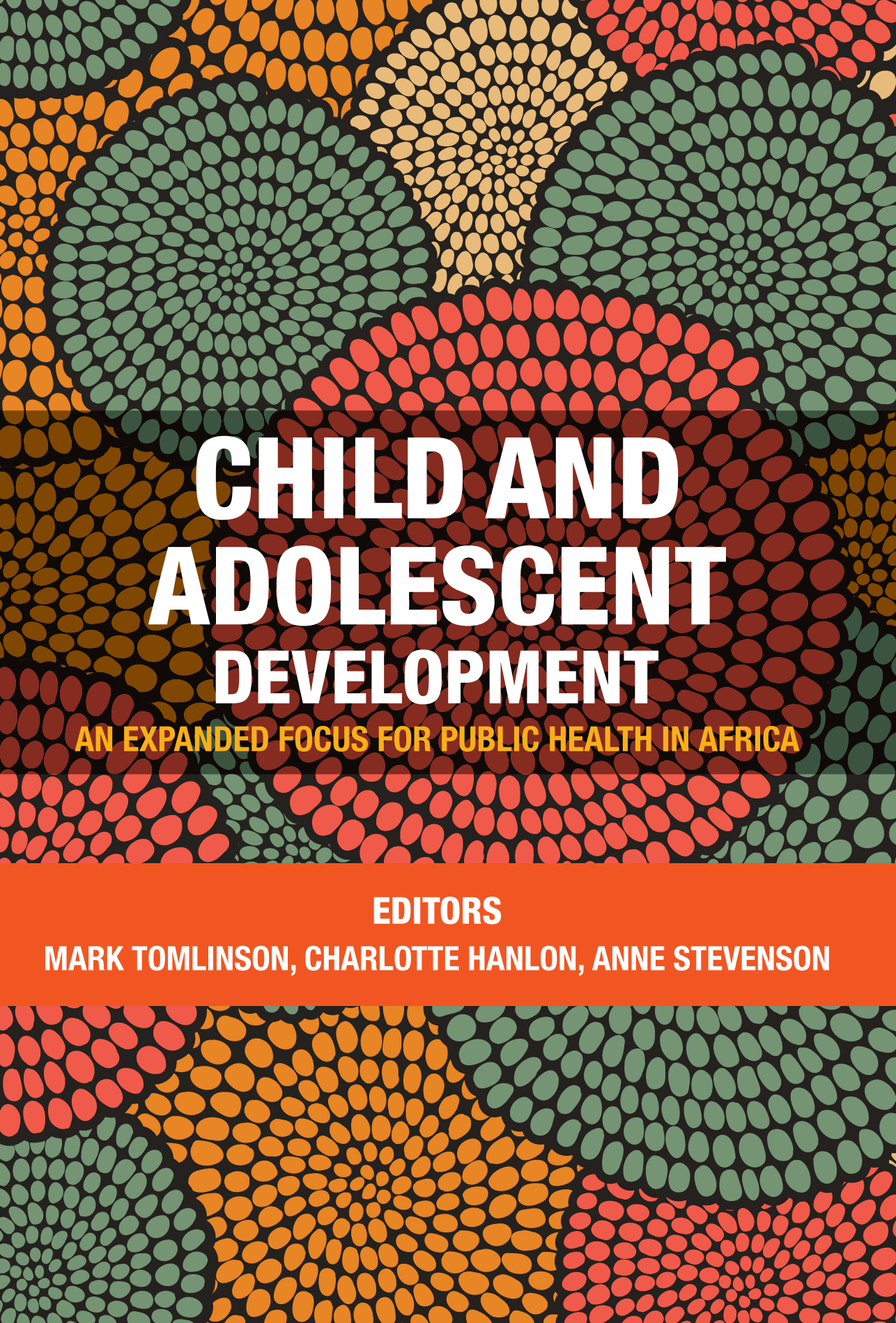
CHILD AND ADOLESCENT DEVELOPMENT
AN EXPANDED FOCUS FOR PUBLIC HEALTH IN AFRICA
EDITORS
MARK TOMLINSON, CHARLOTTE HANLON, ANNE STEVENSON

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List of acronyms and abbreviations

AAU	Association of African Universities
AA-HA!	Accelerated Action for the Health of Adolescents
ACRWC	African Charter on the Rights and Welfare of the Child
AEP	auditory evoked potentials
APRS	Adolescent Psychological Resilience Scale
ARS	Adolescent Resilience Scale
ART	antiretroviral treatment
ARV	antiretroviral
BMI	body mass index
BOT-2	Bruininks-Oseretsky Test of Motor Proficiency, 2nd edn
BRIEF	Behaviour Rating Inventory of Executive Function
Bt20+	Birth to Twenty Plus
CBCC	community-based child-care centres
CBCL	Child Behaviour Checklist
CBO	community-based organisation
CBQFP	Child Behaviour Questionnaire for Parents
CCRT	computerised cognitive rehabilitation training
CD-RISC	Connor-Davidson Resilience Scale
CES-DC	Center for Epidemiological Studies Depression Scale for Children
CMD	common mental disorder
COAT	Colour Object Association Test
COHORTS	Consortium of Health Oriented Research in Transitioning Societies
CPMs	Coloured Progressive Matrices
CRC	Convention on the Rights of the Child
CSI	Child Status Index
CYRM-28	Child and Youth Resilience Measure
DALYs	disability-adjusted life years
DFID	Department for International Development (UK)
DSM-IV	Diagnostic and Statistical Manual of Mental Disorders, 4th edn
DSS	demographic surveillance sites
ECCD	early childhood care and development
ECD	early childhood development
EEA	Environment of Evolutionary Adaptedness
EEG	electroencephalogram
EGRA	Early Grade Reading Assessment
FDG	focus discussion group
FSIN	Food Security Information Network
GFF	Global Finance Facility
HDS	health and demographic surveillance

HIV/AIDS	Human Immunodeficiency Virus/Acquired Immunodeficiency Syndrome
HOME	Home Observation for Measurement of the Environment
HSPH	Harvard T.H. Chan School of Public Health
IAS	Ibadan Adolescent Study
IMCI	integrated management of childhood illnesses
JoL	Journey of Life (programme)
KABC-2	Kaufman Assessment Battery for Children, 2nd edn
K-ABC	Kilifi Assessment Battery
LBW	low birth weight
LMICs	low- and middle-income countries
MDAT	Malawi Developmental Assessment Tool
MDGs	Millennium Development Goals
MINI-Kid	Mini International Neuropsychiatric Interview for Children and Adolescents
MISC	Mediational Intervention for Sensitizing Caregivers
MLE	Mediated Learning Experience (pre-schooler)
MOH	Ministry of Health
MPS	making pregnancy safer
MRI	magnetic resonance imaging
MSEL	Mullen Scales of Early Learning
MUAC	mid-upper arm circumference
NCD	non-communicable disease
NGO	non-governmental organisation
NIMH	National Institute of Mental Health
OR	odds ratio
OVC	orphans or vulnerable children
PA	psychosocial adjustment
PAHO	Pan American Health Organization
PEPFAR	President's Emergency Plan for AIDS Relief (USA)
PIH/IMB	Partners in Health/Inshuti Mu Buzima
PMTCT	prevention of mother-to-child transmission (HIV)
PPP	public–private partnerships
PPTCT	prevention of parent-to-child transmission
PPVT	The Peabody Picture Vocabulary Test
PTSD	post-traumatic stress disorder
RAs	research assistants
RDA	recommended daily allowance
READ	Resilience Scale for Adolescents
R-MATS	Resilience Questionnaire for Middle-Adolescents in Township Schools

ROC	receiver operating characteristic
RS	Resilience Scale
RSAS	Resilience Skills and Abilities Scale
RSCA	Resiliency Scales for Children and Adolescents
RSEA	Resilience Scale for Early Adolescents
SACAS	South African Child Assessment Schedule
SD	standard deviation
SDGs	Sustainable Development Goals
SEM	standard error of the mean
SES	socio-economic status
SSA	sub-Saharan Africa
STI	sexually transmitted infection
TCA	Thematic Content Analysis
TEA-Ch	Tests of Everyday Attention for Children
TOVA	Test of Variables of Attention
TPT	Tactile Performance Test
UN	United Nations
UNAIDS	Joint United Programme on HIV/AIDS
UNHCR	United Nations Refugee Agency
UNICEF	United Nations Children's Fund
USAID	United States Agency for International Development
WASH	water/sanitation/hygiene
WHO	World Health Organization
WISC-IV	Wechsler Intelligence Scale for Children, 4th edn
WPPSI-III	Wechsler Preschool and Primary Scale of Intelligence, 3rd edn
WV	World Vision
YERS	Youth Ecological-Resilience Scale
YLD	years lived with disability
YR: ADS	Youth Resiliency: Assessing Developmental Strengths
YSR	Youth Self Report
ZECDP	Zambia Early Childhood Development Project

Foreword

Child and adolescent development across the life course

Bernadette Daelmans & David A. Ross

Our understanding of what drives child and adolescent development is growing at an exponential pace. Never before has there been such an opportunity to apply this expanding knowledge to underpin child and adolescent development interventions and programmes, and, arguably, there is nowhere in the world that needs this more than Africa. This book not only provides a summary of current knowledge but also helps to set the agenda for future research and intervention design within the many environmental and social contexts in Africa.

The book argues that the recent explosion in knowledge related to three key domains—the physical and social environment in which the child or adolescent is living; the child or adolescent's brain and its functioning; and the genetic and epigenetic environment—means that we are at a 'paradigmatic crisis' point. It is such crises that drive major advances in science and programmes.

In terms of health, the Millennium Development Goals (2000–2015) emphasised maternal and young child survival. The Sustainable Development Goals (SDGs), while continuing to prioritise maternal and young child survival, have extended the focus to include a broader population range and a greater emphasis on individual and social development. This is forcefully shown by the expansion of the Global Strategy for Women's, Children's and Adolescents' Health 2016–2030 (the Global Strategy) to explicitly include an additional focus on the health and development of adolescents, and the drive that all three population groups should not only 'survive' but also 'thrive' and be in a position to 'transform' the society in which they live.

For African countries to achieve the SDGs and the Global Strategy's specific health targets, a life course perspective will be required, and this is clearly articulated in this book. The first 1 000 days from conception to the child's second birthday will be critically important, but the preconception period, the period from the child's second birthday through to adolescence, and the adolescent period which starts with puberty, will also be very important.

The African continent carries a high burden of suboptimal development with 66 per cent of young children at risk due to poverty and stunting. It harbours the world's fastest-growing adolescent population. Yet, there is the potential and the

promise to reap the demographic dividend through change. Countries in Africa have demonstrated the ability to drive this change. In the past 15 years, many have been able to double or even triple their annual rate of reduction in under-five mortality—a remarkable feat. In a similar vein, countries can now capitalise on the cumulative and intergenerational effects of adequate investments in early childhood and adolescence for benefits of life-long health, economic productivity and social cohesion.

The SDGs provide the impetus for action. While there are specific targets that mention early childhood development and adolescent health, the strength of the SDG framework for these areas lies in its integrity and the mutually reinforcing effects of the 16 goals. The Global Strategy has distilled 17 essential targets and provides a roadmap for ending preventable mortality and achieving health and development for women, children and adolescents. Recognising the primacy of country leadership, the Global Strategy is supported by mechanisms of accountability, with annual progress reports presented at the United Nations General Assembly and at the World Health Assembly. Through the Every Woman Every Child movement, governments and partners are joining hands to step up investment and implement the Global Strategy, coordinating technical assistance and making finance available. The opportunity to bring child and adolescent health and development into the spotlight of national and global agendas is unprecedented and should not be missed. At the World Health Organization, we are clear that research and programmes to improve child and adolescent development must be central to global efforts to improve public health, social and economic development, and nowhere more so than in Africa. This book will make an important contribution to this.

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Chapter 1

Ushering in the Sustainable Development Goals

Anne Stevenson, Mark Tomlinson, Xanthe Hunt & Charlotte Hanlon

There have been huge and unprecedented gains in global public health during the past 25 years, and especially in the survival of infants and young children. Between 1990 and 2015, both the global neonatal mortality rate and the under-five mortality rate were halved, resulting in 48 million more children reaching their fifth birthday since 2000.[1]

One of the driving forces behind the improvements was the United Nations' eight Millennium Development Goals (MDGs). Of these eight MDGs, adopted in 2000, three focused explicitly on health (although several of the others addressed health-related factors such as nutrition and sanitation).[2] Within the health-related goals, a great deal of progress has been made in the realm of child mortality reduction, maternal health improvement, HIV/AIDS, malaria and tuberculosis. However, while the MDGs spurred progress in improving survival and access to basic care, they were criticised on a number of fronts. Primarily, critics argued that development in the MDGs was conceived of in simplistic, quantitative and homogenising terms without enough input from the countries the MDGs aimed to target.[3]

Further, MDG progress was uneven across countries.[4] In sub-Saharan Africa and southern Asia, where 80 per cent of the world's people in extreme poverty reside, progress in reaching the MDGs was limited.[5] For instance, out of the 153 countries incorporated under the goals' umbrella, only two African countries—Botswana and Equatorial Guinea—were able to accomplish the first goal, that is, to eradicate hunger and extreme poverty.[6] In light of these critiques, when 2015 saw the ushering in of a

1 United Nations International Children's Emergency Fund (UNICEF), 2015.
2 Regmi et al., 2016, pp. 9–10.
3 AbouZaht & Boerma, 2010, pp. 324–324; Fehling et al., 2013, pp. 1109–1122; Fukuda-Parr, 2010, pp. 26–35; Kabeer, 2005; Mishra, 2004, p. 742; Oya, 2011, pp. 19–33; Saith, 2007; Van Norren, 2012, pp. 825–836; Waage et al., 2010, pp. 991–1023.
4 Fehling et al., 2013, pp. 1109–1122.
5 United Nations (UN), 2012.
6 UN, 2012.

new set of global targets for development, the emphasis was placed squarely on a view of development as a process, and not an end.

The new development agenda, outlined in the Sustainable Development Goals (SDGs), focuses on three core dimensions of sustainable development (social, economic and environmental) for people, the planet, prosperity and peace.[7] The goals set forth in the SDGs build on the gains made in the era of the MDGs, but incorporate a specific emphasis on sustainability, and shift attention to areas neglected by the previous goals.[8]

In the latter respect, while infant, maternal and child mortality rates have decreased, and more people are living, their quality of life may not have improved. Many children continue to live in poverty and continue to be exposed to social and environmental adversity, which affects their developmental potential.[9] In other words, more children will survive but not thrive.

Evidence shows that early childhood development programmes have significant long-term health and socioeconomic advantages, not only for individuals but also for countries.[10] Likewise, healthy, supported, educated children and adolescents are more likely to realise their potential as adults, and in so doing contribute to the economic and social development of countries.[11]

A focus on Africa

A growing proportion of the world's young people reside in Africa. There are approximately 344 million youths in Africa (aged 10 to 24 years), comprising 31 per cent of the total continental population.[12] Furthermore, 180 million children under the age of five years live in Africa, about 143 million of whom reside in sub-Saharan Africa (SSA).[13] These young people, as well as older children, are at risk of falling short of their potential because of the multiple adversities they face in their earliest years, and risks which accumulate over their life course.[14] Despite international gains, under-five child mortality remains high in SSA.[15] Addressing this entails the scale-up and equitable distribution of available, cost-effective interventions in African countries. An emphasis on a holistic and broad-based agenda for child and adolescent health, which not only retains a focus on preventing mortality but also improves the quality of life of African children, is imperative for the achievement of development goals.

7 Sachs, 2012, pp. 2206–2211.
8 Regmi et al., 2016, pp. 9–10.
9 Walker et al., 2007, pp. 145–157.
10 Kuruvilla et al., 2016, pp. 398–400.
11 Kuruvilla et al., 2016, pp. 398–400; UN, 2014.
12 Population Reference Bureau, 2013.
13 Black et al., 2017, pp. 77–90.
14 Chan et al., 2016.
15 Britto et al., 2017, pp. 91–102.

The challenges facing the world's 1.2 billion adolescents are amplified and exacerbated in Africa. With changes in economic conditions in some middle-income African countries, and increasing globalisation, the burden of non-communicable diseases is growing among adolescents on the continent. The SDGs' emphasis on sustainable development and supportive environments, as well as the World Health Organization's new Global Strategy for Women's, Children's and Adolescents' Health, repositions adolescence as a key moment for targeted intervention and ongoing care.[16] In general, young Africans have the best chance of maximising their developmental potential when they are well nourished, provided with optimal nurturing care early in life, provided with good out-of-home care, given the opportunity to access education as early as possible, and are protected from disease, violence and natural disasters.[17]

In Africa, perhaps more than anywhere else, minimising hardships and their effects is central to children flourishing. The SDGs include targets that address the risks and adversities faced by children and adolescents in Africa, including maternal and child health, communicable and non-communicable diseases, substance use and abuse, access to sexual and reproductive health care, sanitation and nutrition, and reducing violence against women and education.

The importance of integrated interventions, supporting Africa's children and adolescents throughout their first 19 years, is at the centre of this book's comprehensive approach to individual development. Helping children and adolescents in Africa reach their potential by investing in early childhood development, and continued support and intervention throughout their first 19 years, benefits societies, economies and countries. However, there is a dearth of information regarding youth in Africa. This book constitutes one attempt to meet this vacuum with a transdisciplinary approach, which not only represents understandings of childhood and adolescence from different schools of thought and fields of inquiry, but also represents work from different parts of the continent. The chapters included here reflect current thinking about challenges facing Africa's youth in the realm of health (malaria, HIV and neurodevelopmental disorders), psychology (attachment theory and maternal and child mental health), and developments in policy and practice (early child development, urbanisation and poverty). Contributions span both the upper end of Africa's economic development spectrum (for instance, Kenya and South Africa) and those countries still grappling with higher rates of extreme poverty and deprivation (for instance, Rwanda and Malawi).

The most prominent themes throughout the book are HIV/AIDS and mental health, and most chapters reference one or both of these topics. While the book's specific aim is an expanded focus on public health within child and adolescent

16 Patton et al., 2016, pp. 2423–2478.
17 Black et al., 2017, pp. 77–90; Britto et al., 2017, pp. 91–102.

development—primarily through the lens of the SDGs—HIV and mental health are integral parts of health in SSA. There are currently an estimated 25 000 000 people living with HIV in SSA,[18] accounting for 69 per cent of all people living with HIV.[19] The impact of HIV has been felt in every component of the health sector (from decimating the number of health-care workers in many countries to overburdening the resources of health systems in others);[20] it cannot be ignored and how it is dealt with will continue to have a huge effect on public health across the continent.

In this book, we also highlight mental health. Non-communicable diseases are beginning to be recognised as one of the biggest threats health systems face around the world. Major depressive disorder alone is the 11th highest cause of disability-adjusted life years (DALYs) across the globe; in 2010, mental health disorders, including substance abuse, accounted for 7.4 per cent of all DALYs and were the leading cause of years lived with disability (YLD) worldwide.[21] As the proportion of the global burden of disease shifts away from communicable diseases towards non-communicable diseases, health systems will have new challenges to overcome.

In addition, several chapters examine or reference attachment theory. In particular, Chapter 8 by Hiltrud Otto, 'Culture and attachment in Africa', is devoted to this topic. Different analyses of attachment theory are presented in the book, sometimes in opposition to one another. These contradictions are not something we have tried to resolve in this volume, but, instead, have chosen to include them to acknowledge that there are distinct and opposing views.

Finally, while thoroughly interrogating the various risk factors and circumstances challenging child and adolescent development in Africa, this book also explicitly highlights how youth on the continent are doing well. Too often health programmers, policy-makers and researchers focus solely on pathology in Africa. While it is crucial to understand risks, it is important to acknowledge and investigate the protective factors which contribute to child resilience and thriving. Chapter 13, 'Resilience in children and adolescents' by Suliman, Van den Heuvel and Seedat lays out a framework of the current literature and the tools to measure healthy development in youth and develop appropriate interventions in Africa.

18 Joint United Nations Programme on HIV/AIDS (UNAIDS), 2013.
19 UNAIDS, 2012.
20 World Health Organization (WHO), 2006.
21 Murray et al., 2013, pp. 2197–2223; Whiteford et al., 2013, pp. 1575–1586.

Next steps

It is now time to capitalise on the public-health gains we have made in Africa over the past two decades, as well as on the rapid expansion of scientific knowledge about child development that has occurred globally. We must continue to push for improvements in child health, not only to improve mortality rates in early childhood, but also to invest in programmes that allow children and adolescents to thrive.

References

AbouZahr, C. & Boerma, T. (2010). Five years to go and counting: Progress towards the Millennium Development Goals. *Bulletin of the World Health Organization*, 88(5), 324.

Black, M.M., Walker, S.P., Fernald, L.C., Andersen, C.T., DiGirolamo, A.M., Lu, C., … Shiffman, J. (2017). Early childhood development coming of age: Science through the life course. *The Lancet*, 389(10064), 77–90.

Britto, P.R., Lye, S.J., Proulx, K., Yousafzai, A.K., Matthews, S.G., Vaivada, T., … Fernald, L.C. (2017). Nurturing care: Promoting early childhood development. *The Lancet*, 389(10064), 91–102.

Chan, M., Lake, A. & Hansen, K. (2016). The early years: Silent emergency or unique opportunity? Washington, DC: World Health Organization. Retrieved from: http://www.who.int/mediacentre/commentaries/early-years-opportunity/en/ Published (2017) in *The Lancet*, 389(10064), 11–13.

Fehling, M., Nelson, B.D. & Venkatapuram, S. (2013). Limitations of the Millennium Development Goals: A literature review. *Global Public Health*, 8(10), 1109–1122.

Fukuda-Parr, S. (2010). Reducing inequality—the missing MDG: A content review of PRSPs and bilateral donor policy statements. *IDS Bulletin*, 41(1), 26–35.

Joint United Nations Programme on HIV/AIDS (UNAIDS). (2012). *Global Fact Sheet.* Retrieved from: http://files.unaids.org/en/media/unaids/contentassets/documents/epidemiology/2012/gr2012/20121120_FactSheet_Global_en.pdf

Joint United Nations Programme on HIV/AIDS (UNAIDS). (2013). *UNAIDS Report on the Global AIDS Epidemic 2013*. Retrieved from: http://www.unaids.org/sites/default/files/media_asset/UNAIDS_Global_Report_2013_en_1.pdf Kabeer, N. (2005). *The Beijing Platform for Action and the Millennium Development Goals: Different Processes, Different Outcomes*. Retrieved from Baku: http://www.un.org/womenwatch/daw/egm/bpfamd2005/experts-papers/EGM-BPFA-MD-MDG-2005-EP.11.pdf

Kuruvilla, S., Bustreo, F., Kuo, T., Mishra, C., Taylor, K., Fogstad, H., … Thomas, J. (2016). The Global Strategy for Women's, Children's and Adolescents' Health (2016–2030): A roadmap based on evidence and country experience. *Bulletin of the World Health Organization*, 94(5), 398–400.

Mishra, U.S. (2004). Millennium development goals: Whose goals and for whom? *British Medical Journal*, 329(7468), 742.

Murray, C.J.L., Vos, T., Lozano, R., Naghavi, M., Flaxman, A.D., Michaud, C., … Ross, H. (2013). Disability-adjusted life years (DALYs) for 291 diseases and injuries in 21 regions, 1990–2010: A systematic analysis for the Global Burden of Disease Study, 2010. *The*

Lancet, 380(9859), 2197–2223. Retrieved from: http://www.thelancet.com/journals/lancet/article/PIIS0140-6736(12)61689-4

Oya, C. (2011). Africa and the Millenium Development Goals (MDGs): What´s right, what'swrong and what's missing. *Revista de Economía Mundial,* (27), 19–33.

Patton, G.C., Sawyer, S.M., Santelli, J.S., Ross, D.A., Afifi, R., Allen, N.B., … Bonell, C. (2016). Our future: A *Lancet* commission on adolescent health and wellbeing. *The Lancet*, 387(10036), 2423–2478.

Population Reference Bureau. (2013). *The World's Youth 2013 Data Sheet*. Retrieved from: http://www.prb.org/pdf13/youth-data-sheet-2013.pdf

Regmi, P., Van Teijlingen, E., Hundley, V., Simkhada, P., Sharma, S. & Mahato, P.K. (2016). Sustainable Development Goals: Relevance to maternal and child health in Nepal. *Health Prospect: Journal of Public Health*, 15(1), 9–10.

Sachs, J.D. (2012). From Millennium Development Goals to Sustainable Development Goals. *The Lancet*, 379(9832), 2206–2211.

Saith, A. (2007). Goals set for the poor, goalposts set by the rich. *International Institute of Asian Studies Newsletter*, 45(12–13).

United Nations International Children's Emergency Fund (UNICEF). (2015). *For Every Child, a Fair Chance: The promise of Equity*. Retrieved from: https://www.unicef.org/publications/index_86269.html

United Nations (UN). (2012). *The Millennium Development Goals Report, 2012*. Retrieved from: http://www.un.org/millenniumgoals/reports.shtml

United Nations (UN). (2014). *The Power of 1.8 Billion: Adolescents, Youth and the Transformation of the Future*. Retrieved from: https://www.unfpa.org/sites/default/files/pub-pdf/EN-SWOP14-Report_FINAL-web.pdf

United Nations (UN). (2015). *Transforming our World: The 2030 Agenda for Sustainable Development, 2015*. Retrieved from: http://www.un.org/ga/search/view_doc.asp?symbol=A/RES/70/1&Lang=E

Van Norren, D.E. (2012). The wheel of development: The Millennium Development Goals as a communication and development tool. *Third World Quarterly*, 33(5), 825–836.

Chapter 2

New directions for the science of child development in the African context

Michael J. Boivin & Leslie L. Davidson

Introduction

In his seminal book *The Structure of Scientific Revolutions*, Kuhn (1962) proposed that rather than being cumulative and progressive, scientific advance moved from crisis to crisis. These crises arose as radically new approaches and models were needed to encompass and explain data driven by new and innovative technologies.[1] At the heart of Kuhn's characterisation of scientific history was the notion of 'paradigms'. Paradigms are conceptual frameworks for developing new models and theories to answer questions that arise from new (and old) data gathered within a scientific discipline. At the core of a paradigm are the fundamental presuppositions, often sociological in nature, that guide the methodologies within which practitioners of that science are trained and the standards by which the quality and rigour of their scientific work is judged within the discipline.

We propose that the science of child development is in the midst of a paradigmatic crisis or revolution that is being driven by rapidly expanding technologies and accompanying data in three domains: the environment (infectious disease, nutrition and caregiving, as these affect developmental domains), the brain (e.g., developmental neuroscience), and the gene (e.g., epigenetics). Figure 2.1 illustrates the mutually interactive nature of these three developmental domains, along with the present paradigmatic emphases emerging in child development research. The science of child development is in paradigmatic transition, driven by the need to devise explanatory models for new data rapidly accumulating in each of these three domains (environment, brain and gene). This crisis in the science of child development has been further intensified at the beginning of the 21st century by the adoption of the United Nations Millennium Declaration.

The essence of this declaration was captured by the Millennium Development Goals (MDGs), accepted, endorsed and designed to be achieved by all UN member

1 Kuhn, 1962.

states by 2015. Of the eight MDGs, two were particularly related to the well-being of young (0–10 years of age) children, namely MDG2—to achieve universal primary education, and MDG4—to reduce child mortality. These goals were closely related as decreased mortality and ongoing world population growth result in a growing number of children who survive with disabilities. *The UN charter provided a legal (and moral) mandate to fully provide for the developmental needs of these children*, and although significant progress was reported (*The Millennial Development Goals Report*, United Nations, 2014),[2] MDG2 was superseded by the Sustainable Development Goals (SDGs), adopted on 25 September 2015.[3]

The SDG 2015 mandate was especially important when considering the United Nations Declaration of the Rights of the Child and the Convention on People Living with Disabilities. These UN-based declarations provided the legal framework, which put the moral imperative needed for policy reform at the country level, intended to prioritise the advancement of child development. Such policy initiatives at the country level must be driven by a child development science that provides the evidence-based interventions needed; interventions that are proven to be scalable and sustainable through implementation science. The desperate need for such interventions on a global scale, both in high-income countries and low and middle-income countries (LMICs), is also driving the present paradigmatic revolution for future directions in child development science.

The framework for this review is based on a review published in the NIH/Fogarty Brain Disorders in the Developing World topical supplement in *Nature*.[4] In this review, we described high-impact scientific findings, which emerged from research in low-resource settings, that pertain to the developmental milieu of the child, its relationship to the brain/behaviour neurodevelopmental integrity of the child (neurodevelopmental disorders), and the genetic and epigenetic underpinnings that can drive this relationship (see Figure 2.1). In this chapter, as we review key scientific advances in each of these three domains, we shall propose strategic areas for ongoing and future research that could provide innovative models to fuel significant advances and evidence-based interventions for meeting the developmental needs of children. These strategic areas of research opportunity pertain to new approaches to answering old questions; a process that is at the heart of transitioning from the old to the new, more robust, paradigm. We conclude by summarising ways in which this triumvirate overview (environment, brain structure and cellular communication, and genes) of scientific advance and opportunity for child development research globally can usher in a paradigmatic approach to propel us forward to achieve the 2015 SDGs.

2 UN, 2014.
3 UN, 2015.
4 Boivin et al., 2015, pp. 155–160.

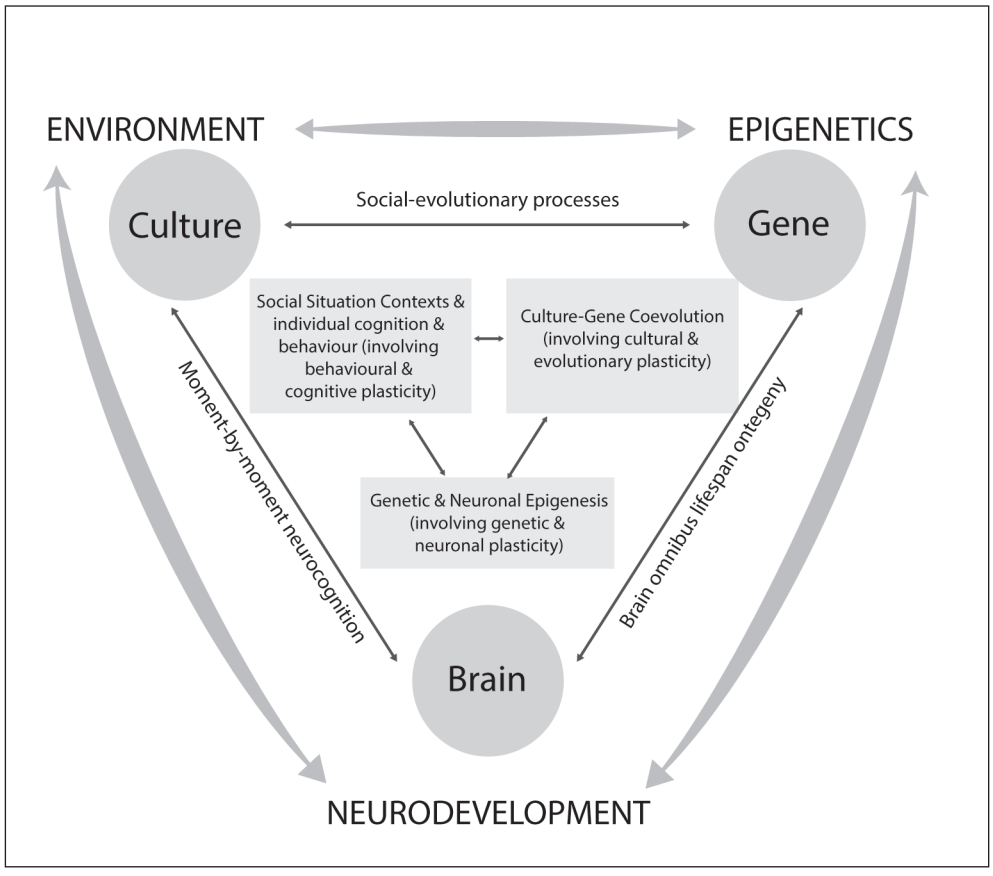

Figure 2.1: Paradigm for child-development science

Source: Compiled by the authors

The paradigmatic challenge to child development in the form of infectious disease

Among the many reasons why the UN global goals for decreased child mortality fell short (*The Millennial Development Goals Report*, United Nations, 2014) is that, despite remarkable efforts, the world has been struggling to conquer both older (e.g., malaria) and newer (e.g., Zika) deadly infectious disorders.[5] Similarly, notwithstanding the significant strides that LMICs have made toward meeting MDG2—universal education—there remains a critical need for effective methodologies to assess and

5 UN, 2014.

treat children with neurodisabilities in these countries.[6] These needs are attributable to the neurodevelopmental challenges that emerge when children survive in conditions that previously would have killed them, almost unequivocally (e.g., HIV),[7] while simultaneously battling newly manifested neurodevelopmental conditions and malnutrition (both undernutrition and overnutrition, i.e., an excess of specific microelements) that have arisen due to changes in their diet.[8] Whatever the aetiology, neither the public health nor the public education systems in the majority of LMICs are capable of handling the growing numbers of students with special needs, as there is a shortage in many countries of schooling opportunities for children with disabilities.

Recent findings and new approaches to the age-old problem of malaria

According to recent estimates, in 2013, there were 198 million cases of malaria of which 584 000 resulted in death.[9] Although malaria cases have fallen since 2000 (by 47 per cent globally and 54 per cent in Africa), mortality rates are still very high: in sub-Saharan Africa, for example, a child dies from malaria every minute. However, in survivors, malaria may cause a range of detrimental outcomes. For example, in sub-Saharan Africa, malaria with neurological impairment has emerged in recent decades as a leading cause of cognitive disabilities.[10] Because of the multiplicity of proposed neuropathological mechanisms and neurodevelopmental outcomes caused by malaria, it has been suggested that this infectious disease is best understood as a complex syndrome involving a variety of functional outcomes.[11] Furthermore, the effects of severe malaria on the brain/behaviour typically co-occur with other contextual factors involving risk (e.g., malnutrition and other infections) and protective factors (e.g., communal influences) ubiquitous in low-resource settings.[12]

Previously largely neglected, the health and educational needs of the one in four children who survive severe malaria and live with cognitive disabilities are now becoming a priority of researchers, policy-makers and practitioners.[13] There is mounting evidence that cognitive rehabilitation, speech and physical therapy, and caregiver-training interventions can be effective in improving cognitive performance and behaviour of treated mother/child dyads in up to 70 per cent of

6 Gladstone et al., 2014, pp. 50–57.
7 Joint United Nations Programme on HIV/AIDS (UNAIDS), 2014.
8 Britto et al., 2016; Daelmans et al., 2016.
9 World Health Organization (WHO), 2014.
10 Idro et al., 2010.
11 Holding & Boivin, 2013, pp. 235–275.
12 Engle et al., 2007, pp. 229–242.
13 John et al., 2008, pp. 92–99.

impoverished households.[14] As approaches to accommodation and intervention are being developed, there is mounting evidence of the brain/behaviour benefits of computerised cognitive rehabilitation training (CCRT) in African children (e.g., Uganda) who have suffered brain injury from severe malaria, as well as from HIV.[15] Neuropsychological improvements associated with CCRT intervention provide justification for further research on the effectiveness of such intervention packages globally, and, if such evidence is found, for implementation of science research on how best to bring such interventions to scale in low-resourced communities.[16]

Recent findings and new approaches to the problem of HIV

Roughly 3.4 million children globally live with HIV infection, and are at high risk for significant neurodevelopmental disabilities. As of 2013, 90 per cent of these live in Africa and India, and only 24 per cent have access to antiretroviral treatment (ART).[17] These children's environmental risk factors are increased and compounded by the conditions of overall poor nutrition that afflict them;[18] they may also suffer from specific micronutrient deficiencies and from parasitic, respiratory and enteric diarrhoeal infections.[19] All these risk factors combine to place these children at very high risk for progressive encephalopathy,[20] preventing them from ever realising their full neurodevelopmental potential. Such compounded risk exists whether a child is infected with HIV (i.e., proximal risk) or affected by HIV (lives in a household or community where HIV has persisting and significant disruptive impact [i.e., distal risk]). As HIV-infected children survive and age into adolescence (in part due to ART and other medical support, when available), they are more likely than their uninfected peers to present with psychiatric symptoms, poor psychosocial adjustment, and behavioural problems that can result in poor performance in school and in the job market.[21] Consequently, they are at higher risk for substance abuse, early sexual debut and associated risky behaviours, and poor adherence to ART medication.[22]

Neurodevelopmental disability due to HIV is prevalent in all countries examined, despite the specific HIV-1 subtype distribution.[23] To understand the aetiology,

14 Alcock & Alibhai, 2013, pp. 155–180.
15 Bangirana et al., 2009, pp. 310–318; Boivin et al., 2010, pp. 667–673; Boivin et al., 2016.
16 Boivin & Giordani, 2009, pp. 113–135.
17 UNAIDS, 2013.
18 Laughton et al., 2013.
19 Kvalsvig et al., 2013, pp. 37–67.
20 Boivin et al., 1995, pp. 13–21; Van Rie et al., 2009, pp. 636–642; Van Rie et al., 2008, pp. 123–128.
21 Laughton et al., 2013, p. 18603; Mellins et al., 2013, pp. 953–962.
22 Alperen et al., 2013, pp. 341–349; Mellins & Malee, 2013, p. 18593; Pearlstein et al., 2013, pp. 294–305.
23 Laughton et al., 2013, p. 18603.

manifestation and prognosis for this disability, for paediatric HIV/AIDS especially, there is an urgent need to standardise neurocognitive assessments across the globe to draw informed conclusions regarding the relationship between HIV-1 clade subtype diversity and the heterogeneity of HIV-associated neurodevelopmental disability. Given the accumulation of risk for all kinds of early developmental insults (e.g., infection, malnutrition and poverty), children in at-risk communities need access to a comprehensive package of interventions to holistically enhance their development.[24] The recent *Lancet* topical focus on early childhood development does an outstanding job of providing the scientific evidence for bringing such interventions to scale as a global priority.[25] This series provides an outstanding overview of evidence-based 'best practices' for how to package and bring to scale a strategic set of intervention services in early childhood development, while pointing out important gaps and needs in the state of the science.

Recent findings and new approaches to the problem of nodding syndrome

The new millennium was marked, in particular, with the manifestation of an enigmatic condition affecting children aged 5–15 years, reported in South Sudan, northern Uganda and southern Tanzania, and labelled 'nodding syndrome'. This unexplained neurological condition is characterised by episodes of repetitive nodding, often coupled with seizure-like behaviours (e.g., convulsions or staring spells) that develop during attempted feeding.[26] Nodding syndrome is also characterised by stunted brain growth, which includes significant brain atrophy near the hippocampal and glia matter of the brain, and significant cerebellar involvement. This is accompanied by lifelong profound neurodisability, severe behaviour problems and high mortality.[27]

The nodding is caused by an atonic seizure, yet the aetiology of this seizure is unknown, although associations with other developmental conditions have been established. Specifically, the syndrome epidemiologically is most prevalent in areas with high infection rates of the parasitic worm *Onchocerca volvulus*, a nematode carried by the black fly whose bites can cause onchocerciasis (also known as Robles' disease or river blindness), a highly prevalent type of blindness caused by infection. Moreover, there have been reports, although inconclusive, of the association between the syndrome and malnutrition.[28] Future research on this syndrome must focus on understanding causes so that it can be prevented, diagnosed early and treated

24 Kvalsvig et al., 2013, pp. 37–67.
25 Black et al., 2016; Britto et al., 2016; Daelmans et al., 2016; Lo et al., 2016; Richter et al., 2016.
26 Foltz et al., 2013, p. 66419; Sejvar et al., 2013, pp. 166–174.
27 Couper, 2002, pp. 549–552.
28 Idro et al., 2013.

effectively. Emerging conditions profoundly affecting children, such as nodding syndrome, provide an important opportunity for developing diagnostic, management and intervention techniques adapted to LMICs, which, in turn, can be used for prevention worldwide.

Recent findings and new approaches to the problem of malnutrition and infectious disease

Childhood malnutrition, both through prenatal and perinatal maternal micronutrient deficiencies[29] and infant micronutrient deficiencies,[30] imposes a heavy burden on neurodevelopment.[31] Primary effects of malnutrition have been associated with elevated risks of mortality, morbidity, and cognitive and social-emotional impairment. While it has been extensively researched and intervened on, it remains a serious challenge to children's development in LMICs.[32] Secondary effects of malnutrition are associated with vulnerability to microbial pathogens that can also severely disrupt neurodevelopment.[33]

Enteric infections

The aetiology of malnutrition is complex. In particular, malnutrition might result from enteric infections of bacteria that are highly prevalent in LMICs, and include both well-known (*E. coli, Vibrio cholerae,* species of *Salmonella, Shigella* and anaerobic streptococci)[34] and emerging pathogens (entero-aggregative *E. coli*, *Cryptosporidium* and *Giardia*).[35] These infections can significantly impact childhood brain/behaviour development, presumably through diminished intestinal absorption, and protein and micronutrient deficiencies compounded by recurring dehydration and malaise.[36]

Konzo disease

Konzo is a permanent, irreversible, upper motor neuron disorder occurring primarily in rural areas of sub-Saharan Africa that are dependent on bitter varieties of cassava (an annual crop cultivated for its edible, starchy, tuberous root which is a major source of carbohydrates and, therefore, the principal food staple). Epidemiological

29 Koura et al., 2013, pp. 486–493.
30 Lozoff et al., 2006, pp. 72–91.
31 Abubakar et al., 2009, pp. 968–973; Abubakar et al., 2009, pp. 652–659; Abubakar et al., 2008, pp. 3780–3782.
32 Abubakar, 2013, pp. 181–202.
33 Sinclair et al., 2011; Thankachan et al., 2010, pp. 1101–1107.
34 Guerrant et al., 1999, pp. 103–112.
35 Guerrant et al., 2008, pp. 707–713.
36 Guerrant et al., 1999, pp. 103–112; Guerrant et al., 2000, pp. 134–138.

studies have documented konzo outbreaks, mostly in women and children, in times of food insecurity brought about by drought, displacement from war or conflict, or other factors that have led to the insufficient processing of the cassava tubers. That is, the insufficient breakdown of linamarin compounds containing cyanide, and resulting neurological damage, appear to lead to outbreaks of konzo disease, which has been documented mostly in the Congo, Central African Republic, Mozambique and Tanzania.[37] Studies have recently documented neurocognitive impairments in children with konzo. Furthermore, even children without konzo living in konzo-affected households may be affected at a subclinical level.[38]

Paradigmatic environmental strategic research priorities in child development

The most strategic research priority for infectious diseases and malnutrition is prevention through public-health education in communities most vulnerable to exposure and subsequent disease. Examples of success are numerous and include distribution of preventive devices and dissemination of best practices, sex education, nutritional recommendations and apprenticeship.[39] Such successful interventions should be further evaluated for scalability, sustainability and dissemination in vulnerable communities. Another research priority is to identify sensitive biomarkers that can allow health scientists to monitor the pathogenic effect of such exposures on the brain development of children. To illustrate, cassava neurotoxicity is mediated through metabolic processes related to the oxidation of high blood levels of cyanogens from poorly processed cassava. Sensitive and specific biomarkers related to this neuropathogenic process can help scientists monitor the progress of konzo disease in children, and the effectiveness of interventions to prevent this disease.[40] Also, there is a tremendous variability in one's susceptibility to, and the course of, infectious diseases. Understanding this variability by considering the genetic characteristics of the child[41] and their interaction, while contextualised by the child's environment and developmental trajectory, is important not only for LMICs, but globally. Finally, we need to understand better how konzo disease alters the gut microbiome and can compound malnutrition resulting from intestinal malabsorption, as well as make a child more vulnerable to bacterial infectious disease.

37 Cliff et al., 1997, pp. 1068–1074; Tylleskar et al., 1993, pp. 638–643; Tylleskar et al., 1994, pp. 959–961.
38 Boivin et al., 2013, pp. 1231–1239.
39 Banea et al., 2013, pp. 506–513; Banea et al., 2014, pp. 28–32; Banea et al. 2012, pp. 1517–1523.
40 Makila-Mabe et al., 2014, p. 107191.
41 Oria et al., 2007, pp. 1099–1107; Oria et al., 2005, pp. 310–316.

New paradigmatic methodologies in the surveillance of neurodevelopmental disorders

As exemplified above, there are problems that pertain to the aetiology, prevention, manifestation and treatment of neurodevelopmental disorders from infectious disease and malnutrition. These problems require new approaches, which can be provided by a more robust paradigm that incorporates explanatory models and technologies. Country or regional surveillance may offer evidence as to the causal pattern, the level of severity, and even specific interventions to protect children in the context of implementation science. Below we outline strategic considerations that should be taken into account as such surveillance is designed and implemented.

Advances through the expansion of interdisciplinary approaches

Research in LMICs needs to take into account the complex multifactorial causes of neurodevelopmental disorders. These causes include challenges at multiple levels of children's development—natural disasters, social unrest, poverty and infection-prone environments. In addition, increased industrialisation is leading to exposure to new environmental toxins, over and above those already present, such as pollution from biomass fuels. These complex systems of challenges and developmental risk factors call for comprehensive interdisciplinary approaches to understanding developmental trajectories of all children, and especially children with neurodevelopmental disorders in LMICs. An example is the need for maternal health programmes to work closely with early childhood programmes to ensure optimal pregnancy outcomes and develop effective interventions to enhance child development.

Advances by building on existing platforms of health research and service

Over the past decade, international donors, through programmes such as PEPFAR, UNAIDS, the World Health Organization and the Bill and Melinda Gates Foundation, have made drugs and services significantly more accessible for infectious diseases such as HIV, tuberculosis and malaria. More recently, the Gates Foundation has renewed its commitment to make treatments more available for neglected tropical diseases.[42] These advances have provided a public health infrastructure for improved maternal and infant health outcomes. These include the implementation of scientific research for the prevention of major risk factors for child neurodisability in LMICs, such as the prevention of low birth weight, preterm birth and neonatal asphyxia, as well as vaccination intermittent chemo-prophylactic treatment for infectious diseases such as malaria and meningitis. Many of these platforms already work with government ministries to provide an evidence base that has supported changes in

42 Liese et al., 2014, pp. 162–171.

policy. Also needed are evidence-based public health strategies for incorporating child neurodisability screening, clinical evaluation and rehabilitation packages into the palliative health-care systems in such settings.

Advances through the development and use of new technologies

Multiple types of new technologies are expanding research approaches in LMICs and providing an enormous potential to transform health-care delivery. Development of new mobile technologies for surveillance, assessment and treatment are particularly needed in LMICs, where cellphone ownership is rising rapidly, but access to traditional health care and providers is often limited. Computerised interventions are already being applied to the treatment of children with cerebral malaria.[43] The miniaturisation of diagnostic technologies for genetics and genomics, infectious agents and harmful environmental agents will enable a better understanding of gene–environment interactions and point to new therapeutic approaches.[44]

Advances through greater cross-country collaboration

Parallel and/or complementary research programmes are being supported in different countries and regions leading to a need to bring together key country partners and investigators to identify best practices and research opportunities. For instance, key areas of opportunity include the development of assessment tools that can be launched in LMIC settings and are culturally appropriate. A noteworthy example is validation and normative sample collection currently underway for the development of the International Guide for Monitoring Children's Development.[45] An excellent example of an early childhood stimulation and nutritional intervention package to enhance infant and early child development, which has been evaluated globally in LMIC settings, is the MAL-ED programme.[46]

Advances through implementation science

Research in LMICs cannot be divorced from the health systems in which the populations are situated. Research frameworks are needed that will support the implementation of findings from well-designed studies of children's health. Scaling up research to the community will require cooperation with governmental and non-governmental partners to ensure sustainability. Significant advances have been made in the 'task-shifting' of health-care service provision from more highly trained

43 Boivin et al., 2008, p. 7; Boivin et al., 2010, pp. 667–673.
44 Boivin & Giordani, 2009, pp. 113–135.
45 Ertem et al., 2008, pp. 581–589.
46 Gowani et al., 2014, pp. 149–161; Stenberg et al., 2013, pp. 1333–1354; Turab et al., 2014, pp. 304–309; Yousafzai et al., 2014, pp. 1282–1293.

to less highly trained, field-based, community health-care workers. This approach has been especially helpful in addressing the global shortage of psychiatrists in global mental-health service settings.[47] This needs to be adopted more widely in child disability interventions through implementation science research.

Conclusion

In this review, we describe both significant scientific findings and continuing challenges that have emerged from research in LMIC settings, which pertain to the social and developmental context of the child, especially in the context of infectious disease and malnutrition. New technologies are providing ever-more sensitive biomarkers that can be related to the brain/behaviour neurodevelopmental integrity of the child. New technologies are also emerging that link the regional and global surveillance of these neurodisabilities from environmental risk to the genetic and epigenetic underpinnings that can drive this relationship. Strategic areas of ongoing and future research opportunities consistently occur at the junctures between the environmental milieu, the occurrence of neurodisability and the genetic basis of these relationships. However, these targets of opportunity will be driven by models that can accommodate the use of new data, gathered by new technologies, to offer a fresh approach to old problems in child development, especially in LMICs.

A robust paradigm providing a robust and comprehensive framework is needed that will seamlessly integrate environmental milieu, neurodevelopment and genetics (especially epigenetics). Such a paradigm would generate significant advances in evidence-based interventions for meeting the developmental needs of children worldwide. Likewise, in providing new and effective evidence-based approaches to old problems, we would finally fulfil the UN moral and legal mandate to provide for better health and development in children as a fundamental human right.

We are in the midst of a paradigmatic transition stemming from rapid technological advance, data and information in the face of global crisis. However, it is evident from the challenges discussed in our review of the three principal domains contributing to child development (environment, genes, brain), that much work remains to be done, especially at the junctions between these three mutually interactive and rapidly advancing scientific domains. As integrative work at these junctures continues to expand and advance, the science of child development will become increasingly able to provide a comprehensive, methodologically powerful and theoretically dominant framework for guiding us forward globally, within both LMICs and high-income countries. This is the power and potential of the

47 Buttorff et al., 2012, pp. 813–821; Mendenhall et al., 2014, pp. 33–42; Patel, 2009, pp. 1759–1762; Patel, 2012, pp. 6–12; Patel et al., 2009, pp. 37–44.

paradigmatic transition within which we find the science of human development, especially as applied within the context of LMICs.

References

Abubakar, A. (2013). Psychosocial aspects of malnutrition among African children: Antecedents, consequences, and interventions. In M.J. Boivin & B. Giordani (eds). *Specialty Topics in Pediatric Neuropsychology*, Vol. *Neuropsychology of African Children: Risk and Resilience*. New York: Springer, pp. 181–202.

Abubakar, A., Holding, P., Newton, C.R., Van Baar, A. & Van de Vijver, F.J. (2009). The role of weight for age and disease stage in poor psychomotor outcome of HIV-infected children in Kilifi, Kenya. *Developmental Medicine and Child Neurology*, 51(12), 968–973.

Abubakar, A., Holding, P., Van de Vijver, F.J., Newton, C. & Van Baar, A. (2009). Children at risk for developmental delay can be recognised by stunting, being underweight, ill health, little maternal schooling or high gravidity. *Journal of Child Psychology and Psychiatry*, 51(6), 652–659.

Abubakar, A., Van de Vijver, F., Van Baar, A., Mbonani, L., Kalu, R., Newton, C. & Holding, P. (2008). Socioeconomic status, anthropometric status, and psychomotor development of Kenyan children from resource-limited settings: A path-analytic study. *Early Human Development*, 84(9), 613–621.

Alcock, K. & Alibhai, N. (2013). Language development in sub-Sahara Africa. In M.J. Boivin & B. Giordani (eds). *Specialty Topics in Pediatric Neuropsychology*, Vol. *Neuropsychology of African Children: Risk and Resilience*. New York: Springer, pp. 155–180.

Alperen, J., Brummel, S., Tassiopoulos, K., Mellins, C. A., Kacanek, D., Smith, R., … Moscicki, A.B. (2013). Prevalence of and risk factors for substance use among perinatally human immunodeficiency virus-infected and perinatally exposed but uninfected youth. *Journal of Adolescent Health*, 54(3), 341–349.

Banea, J.P., Bradbury, J.H., Mandombi, C., Nahimana, D., Denton, I.C., Kuwa, N. & Tshala Katumbay, D. (2013). Control of konzo by detoxification of cassava flour in three villages in the Democratic Republic of Congo. *Food and Chemical Toxicology*, 60, 506–513.

Banea, J.P., Bradbury, J.H., Mandombi, C., Nahimana, D., Denton, I.C., Kuwa, N. & Tshala Katumbay, D. (2014). Effectiveness of wetting method for control of konzo and reduction of cyanide poisoning by removal of cyanogens from cassava flour. *Food and Nutrition Bulletin, 35*(1), 28–32.

Banea, J.P., Nahimana, G., Mandombi, C., Bradbury, J.H., Denton, I.C. & Kuwa, N. (2012). Control of konzo in DRC using the wetting method on cassava flour. *Food and Chemical Toxicology*, 50(5), 1517–1523.

Bangirana, P., Boivin, M.J. & Giordani, B. (2013). Computerized cognitive rehabilitation therapy (CCRT) for African children: Evidence for neuropsychological benefit and future directions. In M.J. Boivin & B. Giordani (eds). *Neuropsychology of Children in Africa: Perspectives on Risk and Resilience*, Vol. 1. New York: Springer Science+Business Media, pp. 277–298.

Bangirana, P., Giordani, B., John, C.C., Page, C., Opoka, R.O. & Boivin, M.J. (2009). Immediate neuropsychological and behavioral benefits of computerized cognitive rehabilitation in

Ugandan pediatric cerebral malaria survivors. *Journal of Develpmental and Behavioral Pediatrics*, 30(4), 310–318.

Black, M.M., Walker, S.P., Fernald, L.C., Andersen, C.T., DiGirolamo, A.M., Lu, C., … Lancet Early Childhood Development Series Steering Committee. (2016). Early childhood development coming of age: Science through the life course. *The Lancet*, 389(10064), 77–90.

Boivin, M.J., Bangirana, P., Tomac, R., Parikh, S., Opoka, R.O., Nakasujja, N., … Giordani, B. (2008). Neuropsychological benefits of computerized cognitive rehabilitation training in Ugandan children surviving cerebral malaria and children with HIV. *BMC Proceedings*, 2(Suppl. 1), P7.

Boivin, M.J., Busman, R.A., Parikh, S.M., Bangirana, P., Page, C.F., Opoka, R.O. & Giordani, B. (2010). A pilot study of the neuropsychological benefits of computerized cognitive rehabilitation in Ugandan children with HIV. *Neuropsychology*, 24(5), 667–673.

Boivin, M. J. & Giordani, B. (2009). Neuropsychological assessment of African children: Evidence for a universal basis to cognitive ability. In J.Y. Chiao (ed.). *Cultural Neuroscience: Cultural Influences on Brain Function*, Vol. 178. New York: Elsevier Publications, pp. 113–135.

Boivin, M.J., Green, S.D., Davies, A.G., Giordani, B., Mokili, J.K. & Cutting, W.A. (1995). A preliminary evaluation of the cognitive and motor effects of pediatric HIV infection in Zairian children. *Health Psychology*, 14(1), 13–21.

Boivin, M.J., Kakooza, A.M., Warf, B.C., Davidson, L.L. & Grigorenko, E.L. (2015). Reducing neurodevelopmental disorders and disability through research and interventions. *Nature*, 527(7578), S155–160.

Boivin, M.J., Nakasujja, N., Sikorskii, A., Opoka, R.O. & Giordani, B. (2016). A randomized controlled trial to evaluate if computerized cognitive rehabilitation improves neurocognition in Ugandan children with HIV. *AIDS Research and Human Retroviruses*, 32(8), 743–755.

Boivin, M.J., Okitundu, D., Makila-Mabe Bumoko, G., Sombo, M.T., Mumba, D., Tylleskar, T., … Tshala-Katumbay, D. (2013). Neuropsychological effects of konzo: A neuromotor disease associated with poorly processed cassava. *Pediatrics*, 131(4), e1231–1239.

Britto, P.R., Lye, S.J., Proulx, K., Yousafzai, A.K., Matthews, S.G., Vaivada, T., … Early Childhood Development Interventions Review Group. (2016). Nurturing care: Promoting early childhood development. *The Lancet*, 389(10064), 91–102.

Buttorff, C., Hock, R.S., Weiss, H.A., Naik, S., Araya, R., Kirkwood, B.R., … Patel, V. (2012). Economic evaluation of a task-shifting intervention for common mental disorders in India. *Bulletin of the World Health Organanization*, 90(11), 813–821.

Cliff, J., Nicala, D., Saute, F., Givragy, R., Azambuja, G., Taela, A., … Howarth, J. (1997). Konzo associated with war in Mozambique. *Tropical Medicine & International Health, 2*(11), 1068–1074.

Couper, J. (2002). Prevalence of childhood disability in rural KwaZulu-Natal. *South African Medical Journal*, 92(7), 549–552.

Daelmans, B., Darmstadt, G.L., Lombardi, J., Black, M.M., Britto, P.R., Lye, S., … Lancet Early Childhood Development Series Steering Committee. (2016). Early childhood development: The foundation of sustainable development. *The Lancet*, 389(10064), 9–11.

Engle, P.L., Black, M.M., Behrman, J.R., Cabral de Mello, M., Gertler, P.J., Kapiriri, L., … Young, M.E. (2007). Strategies to avoid the loss of developmental potential in more than 200 million children in the developing world. *The Lancet*, 369(9557), 229–242.

Ertem, I.O., Dogan, D.G., Gok, C.G., Kizilates, S.U., Caliskan, A., Atay, G., … Cicchetti, D.V. (2008). A guide for monitoring child development in low- and middle-income countries. *Pediatrics*, 121(3), e581–589.

Foltz, J.L., Makumbi, I., Sejvar, J.J., Malimbo, M., Ndyomugyenyi, R., Atai-Omoruto, A.D., … Lwamafa, D.K. (2013). An epidemiologic investigation of potential risk factors for nodding syndrome in Kitgum District, Uganda. *PLOS ONE*, 8(6), e66419.

Gladstone, M., Mallewa, M., Alusine Jalloh, A., Voskuijl, W., Postels, D., Groce, N., … Molyneux, E. (2014). Assessment of neurodisability and malnutrition in children in Africa. *Seminars in Pediatric Neurology*, 21(1), 50–57.

Gowani, S., Yousafzai, A.K., Armstrong, R. & Bhutta, Z.A. (2014). Cost effectiveness of responsive stimulation and nutrition interventions on early child development outcomes in Pakistan. *Annals of the New York Academy of Sciences*, 1308, 149–161.

Guerrant, D.I., Moore, S.R., Lima, A.A., Patrick, P.D., Schorling, J.B. & Guerrant, R.L. (1999). Association of early childhood diarrhea and cryptosporidiosis with impaired physical fitness and cognitive function four–seven years later in a poor urban community in northeast Brazil. *American Journal of Tropical Medicine and Hygiene*, 61(5), 707–713.

Guerrant, R.L., Lima, A.A., Barboza, M., Young, S., Silva, T., Barrett, L., … Moore, S. (1999). Mechanisms and impact of enteric infections. *Advances in Experimental Medicine and Biology*, 473, 103–112.

Guerrant, R.L., Lima, A.A. & Davidson, F. (2000). Micronutrients and infection: Interactions and implications with enteric and other infections and future priorities. *Journal of Infectious Diseases*, 182(Suppl. 1), S134–138.

Guerrant, R.L., Oria, R.B., Moore, S.R., Oria, M.O. & Lima, A.A. (2008). Malnutrition as an enteric infectious disease with long-term effects on child development. *Nutrition Reviews*, 66(9), 487–505.

Holding, P. & Boivin, M.J. (2013). The assessment of neuropsychological outcomes in pediatric severe malaria. In M.J. Boivin & B. Giordani (eds). *Specialty Topics in Pediatric Neuropsychology*, Vol. *Neuropsychology of African Children: Risk and Resilience*. New York: Springer, pp. 235–275.

Idro, R., Kakooza-Mwesige, A., Balyejjusa, S., Mirembe, G., Mugasha, C., Tugumisirize, J. & Byarugaba, J. (2010). Severe neurological sequelae and behaviour problems after cerebral malaria in Ugandan children. *BMC Research Notes, 3*(1), 104.

Idro, R., Opoka, R.O., Aanyu, H.T., Kakooza-Mwesige, A., Piloya-Were, T., Namusoke, H., … Tumwine, J.K. (2013). Nodding syndrome in Ugandan children—clinical features, brain imaging and complications: A case series. *BMJ Open*, 3(5), e002540.

John, C.C., Bangirana, P., Byarugaba, J., Opoka, R.O., Idro, R., Jurek, A.M., … Boivin, M.J. (2008). Cerebral malaria in children is associated with long-term cognitive impairment. *Pediatrics*, 122(1), e92–99.

Joint United Nations Programme on HIV/AIDS (UNAIDS). (2013). *UNAIDS Report on the Global AIDS Epidemic, 2010*. Retrieved from: http://www.unaids.org/globalreport/Global_report.htm

Joint United Nations Programme on HIV/AIDS (UNAIDS). (2014). *Children and HIV Fact Sheet*. Retrieved from: http://www.unaids.org/en/media/unaids/contentassets/documents/unaidspublication/2014/FactSheet_Children_en.pdf

Klein, P. (ed.). (1996). *Early Intervention: Cross-cultural Experiences with a Mediational Approach*. New York: Garland Press.

Klein, P. (ed.). (2001). *Seeds of Hope: Twelve Years of Early Intervention in Africa*. Oslo, Norway: Unipub Forlag.

Koura, K.G., Boivin, M.J., Davidson, L.L., Ouedraogo, S., Zoumenou, R., Alao, M.J., … Bodeau-Livinec, F. (2013). Usefulness of child development assessments for low-resource settings in francophone Africa. *Journal of Developmental and Behavioral Pediatrics*, 34(7), 486–493.

Kuhn, T.S. (1962). *The Structure of Scientific Revolutions*. Chicago, IL: Chicago University Press.

Kvalsvig, J.D., Taylor, M., Kauchali, S. & Chhagan, M. (2013). Acknowledging methodological complexity in assessing children in HIV-affected communities in KwaZulu-Natal province, South Africa. In M.J. Boivin & B. Giordani (eds). *Neuropsychology of Children in Africa: Perspectives on Risk and Resilience*, Vol. *Neuropsychology of Children in Africa: Perspectives on Risk and Resilience*. New York: Springer Science+Business Media, pp. 37–67.

Laughton, B., Cornell, M., Boivin, M. & Van Rie, A. (2013). Neurodevelopment in perinatally HIV-infected children: A concern for adolescence. *Journal of the International AIDS Society*, 16, 18603.

Liese, B.H., Houghton, N. & Teplitskaya, L. (2014). Development assistance for neglected tropical diseases: Progress since 2009. *International Health*, 6(3), 162–171.

Lo, S., Das, P. & Horton, R. (2016). A good start in life will ensure a sustainable future for all. *The Lancet*, 389(10064), 8–9.

Lozoff, B., Beard, J., Connor, J., Barbara, F., Georgieff, M. & Schallert, T. (2006). Long-lasting neural and behavioral effects of iron deficiency in infancy. *Nutrition Reviews*, 64(5 Pt 2), S34–43; discussion S72–91.

Makila-Mabe, B.G., Kikandau, K.J., Sombo, T.M., Okitundu, D.L., Mwanza, J.C., Boivin, M.J., … Tshala-Katumbay, D. (2014). Serum 8,12-iso-iPF2alpha-VI isoprostane marker of oxidative damage and cognition deficits in children with konzo. *PLOS ONE*, 9(9), e107191.

Mellins, C.A., Elkington, K.S., Leu, C.S., Santamaria, E.K., Dolezal, C., Wiznia, A., … Abrams, E.J. (2013). Prevalence and change in psychiatric disorders among perinatally HIV-infected and HIV-exposed youth. *AIDS Care*, 24(8), 953–962.

Mellins, C.A. & Malee, K.M. (2013). Understanding the mental health of youth living with perinatal HIV infection: Lessons learned and current challenges. *Journal of the International AIDS Society*, 16, 18593.

Mendenhall, E., De Silva, M.J., Hanlon, C., Petersen, I., Shidhaye, R., Jordans, M., … Lund, C. (2014). Acceptability and feasibility of using non-specialist health workers to deliver mental health care: Stakeholder perceptions from the PRIME district sites in Ethiopia, India, Nepal, South Africa, and Uganda. *Social Science and Medicine*, 118, 33–42.

Oria, R.B., Patrick, P.D., Blackman, J.A., Lima, A.A. & Guerrant, R.L. (2007). Role of apolipoprotein E4 in protecting children against early childhood diarrhea outcomes and implications for later development. *Medical Hypotheses*, 68(5), 1099–1107.

Oria, RB., Patrick, P.D., Zhang, H., Lorntz, B., De Castro Costa, C.M., Brito, G.A., … Guerrant, R.L. (2005). APOE4 protects the cognitive development in children with heavy diarrhea burdens in Northeast Brazil. *Pediatric Research*, 57(2), 310–316.

Patel, V. (2009). The future of psychiatry in low- and middle-income countries. *Psychological Medicine*, 39(11), 1759–1762.

Patel, V. (2012). Global mental health: From science to action. *Harvard Review of Psychiatry*, 20(1), 6–12.

Patel, V., Goel, D.S. & Desai, R. (2009). Scaling up services for mental and neurological disorders in low-resource settings. *International Health*, 1(1), 37–44.

Pearlstein, S.L., Mellins, C.A., Dolezal, C., Elkington, K.S., Santamaria, E.K., Leu, C.S., … Abrams, E.J. (2013). Youth in transition: Life skills among perinatally HIV-infected and HIV-exposed adolescents. *Journal of Pediatric Psychology*, 39(3), 294–305.

Richter, L.M., Daelmans, B., Lombardi, J., Heymann, J., Boo, F.L., Behrman, J.R., … the Lancet Early Childhood Development Series Steering Committee. (2016). Investing in the foundation of sustainable development: Pathways to scale up for early childhood development. *The Lancet* 28(Suppl. 2), 145–152.

Sejvar, J.J., Kakooza, A.M., Foltz, J.L., Makumbi, I., Atai-Omoruto, A.D., Malimbo, M., … Lwamafa, D. (2013). Clinical, neurological, and electrophysiological features of nodding syndrome in Kitgum, Uganda: An observational case series. *The Lancet Neurology*, 12(2), 166–174.

Sinclair, D., Abba, K., Grobler, L. & Sudarsanam, T.D. (2011). Nutritional supplements for people being treated for active tuberculosis. *Cochrane Database of Systematic Reviews,* (11), CD006086.pub3.

Stenberg, K., Axelson, H., Sheehan, P., Anderson, I., Gulmezoglu, A.M., Temmerman, M., … Bustreo, F. (2013). Advancing social and economic development by investing in women's and children's health: A new Global Investment Framework. *The Lancet*, 383(9925), 1333–1354.

Thankachan, P., Muthayya, S., Sierksma, A., Eilander, A., Thomas, T., Duchateau, G.S., … Kurpad, A.V. (2010). *Helicobacter pylori* infection does not influence the efficacy of iron and vitamin B(12) fortification in marginally nourished Indian children. *European Journal of Clinical Nutrition*, 64(10), 1101–1107.

Turab, A., Soofi, S.B., Ahmed, I., Bhatti, Z., Zaidi, A.K. & Bhutta, Z.A. (2014). Demographic, socioeconomic, and health characteristics of the MAL-ED network study site in rural Pakistan. *Clinical Infectious Diseases*, 59(Supp. 4), S304–309.

Tylleskar, T., Legue, F.D., Peterson, S., Kpizingui, E. & Stecker, P. (1994). Konzo in the Central African Republic. Neurology, 44(5), 959–961.

United Nations (UN). (2014). The Millenium Development Goals Report, 2014. Retrieved from: http://www.un.org/millenniumgoals/2014 MDG report/MDG 2014 English web. pdf

United Nations (UN). (2015). Sustainable Development Goals: 17 Goals to Transform our World. Retrieved from: un.org.

Van Rie, A., Dow, A., Mupuala, A. & Stewart, P. (2009). Neurodevelopmental trajectory of HIV-infected children accessing care in Kinshasa, Democratic Republic of Congo. Journal of Acquired Immune Deficiciency Syndrome, 52(5), 636–642.

Van Rie, A., Mupuala, A. & Dow, A. (2008). Impact of the HIV/AIDS epidemic on the neurodevelopment of preschool-aged children in Kinshasa, Democratic Republic of the Congo. Pediatrics, 122(1), e123–128.

World Health Organization (WHO). (2014). The World Malaria Report. Geneva, Switzerland: WHO Press. Retrieved from: http://www.who.int/malaria/publications/world_malaria_report/en/

Yousafzai, A.K., Rasheed, M.A., Rizvi, A., Armstrong, R. & Bhutta, Z.A. (2014). Effect of integrated responsive stimulation and nutrition interventions in the Lady Health Worker programme in Pakistan on child development, growth, and health outcomes: A cluster-randomised factorial effectiveness trial. The Lancet, 384(9950), 1282–1293.

Chapter 3

Mental health policy in Africa: Gaps, needs and priorities for children and adolescents

Crick Lund

Introduction

Mental health is not a major priority on the public health policy agenda in Africa,[1] as shown by emerging evidence about the extent of general mental health policy on the continent.[2] However, less is known about policies for the mental health needs of children and adolescents. We do know that among low- and middle-income countries (LMICs) and within the broad field of mental health, the needs of children and adolescents are neglected.[3]

What then is the extent of mental health policy coverage for children and adolescents in African countries? How can we conceptualise African mental health policies that could be tailored to the needs of children and adolescents? And what strategies are required to strengthen such policy and its implementation? The purpose of this chapter is to develop a conceptual framework and identify some of the key challenges facing child and adolescent mental health policies in Africa; to map current child and adolescent mental health policy, both nationally and according to key international agencies; to identify gaps in current policy; and to suggest strategies for strengthening policy development and implementation on the continent.

Conceptual framework

When trying to make sense of the complex area of mental health policy, it is helpful to have a conceptual framework. Flisher and his colleagues developed a useful framework for understanding mental health policy development and implementation in Africa,[4] which can also be adapted for understanding policy development for children and adolescents.

1 Flisher et al., 2007, pp. 505–516.
2 Lund, 2010, pp. 547–549; World Health Organization (WHO), 2011.
3 Patel et al., 2008, pp. 313–334.
4 Flisher et al., 2007, pp. 505–516.

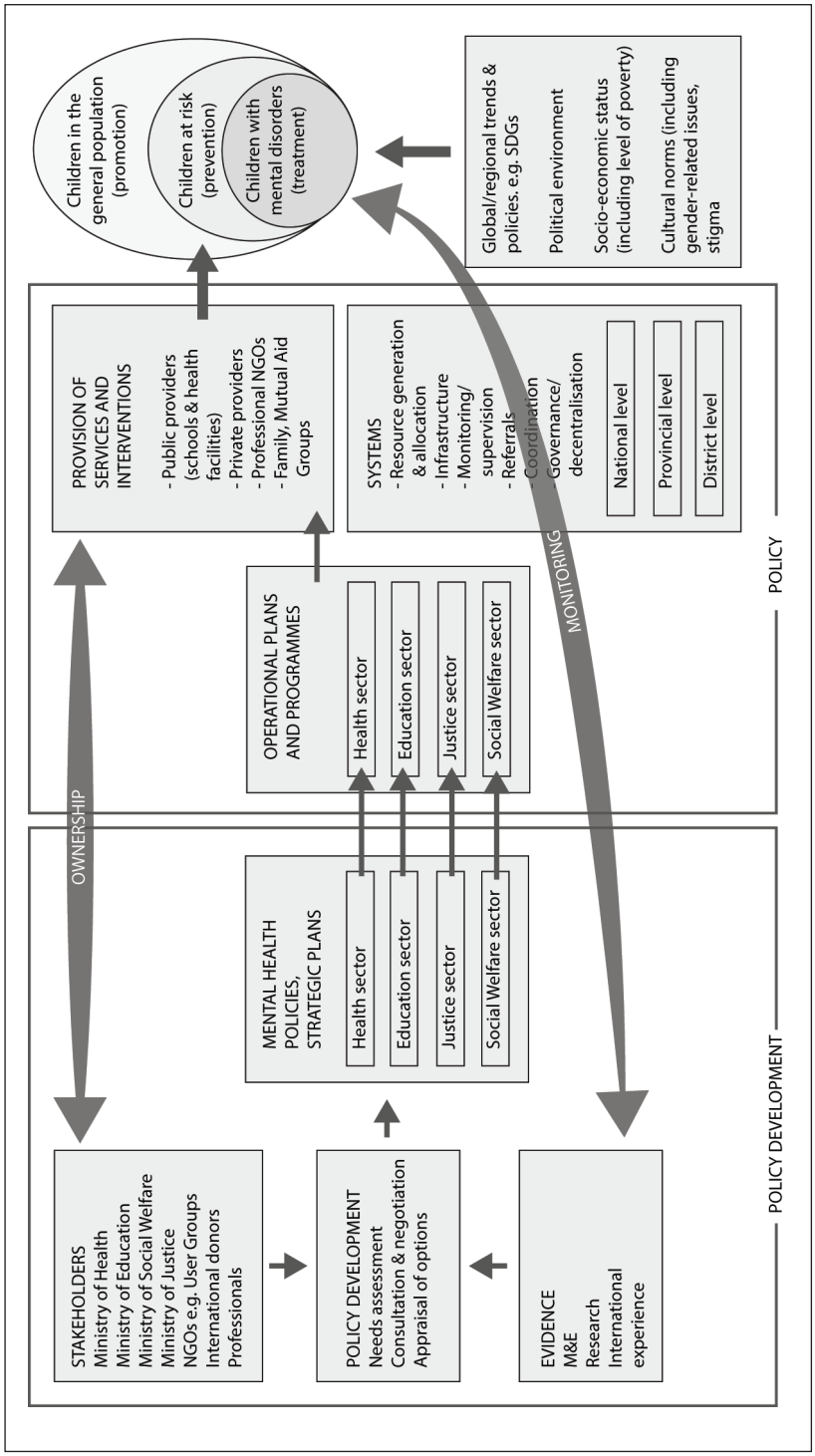

Figure 3.1: Framework for child mental health policy development and implementation in Africa

Source: Adapted from Flisher et al., 2007, pp. 505–516

As shown on the left of Figure 3.1, national policies are typically developed with the input of key *stakeholders* (those who have a stake or an interest in the policy issue at hand), using *evidence* that may (or may not) be available. Usually this *policy development* process involves conducting a needs assessment, consultation and negotiation between key stakeholder groups, and an appraisal of options. This is seldom a neat and logical process, and frequently involves power struggles between the various stakeholder groups, many of whom have vested interests in the issue at hand. In the case of mental health policy for children, the Ministry of Health often leads this process, with input from other sectors. If supported by sufficient evidence and political will, this leads to the publication of *policy and strategic plan* documents, as well as *legislation*. This frequently depends on the extent to which child mental health is aligned with other current policy priorities. Often the issues pertaining to child mental health are embedded in other policies, such as general health or education policies, and this in itself can pose a risk for the attention given to child mental health needs.

This process of policy development has little impact on the mental health of children and adolescents in the population without the crucial step of *implementation*. Weak implementation systems frequently lead to policies serving little function other than that of weighing down the bookshelves and filing cabinets in the Ministry of Health offices. For successful implementation to occur, it is essential that policies and laws are translated into *operational plans and programmes*, typically in the various sectors, depending on how government organises itself. The extent of collaboration between these sectors can significantly facilitate or obstruct policy implementation.

These operational plans and programmes then need to be implemented through the effective delivery of *services and interventions*—in the case of child mental health these are usually delivered in preschools, schools and health facilities in the public and private sectors and by non-governmental organisations (NGOs). These services, in turn, rely heavily on the *systems* that need to be in place at the national, provincial and district levels to enable them to function. These include the allocation of resources (financial and human resources), infrastructure, monitoring, supervision, referral pathways, coordination and governance. The interventions thus organised can be directed either at children in the general population (in the form of mental health promotion), at children at risk (in the form of prevention of mental disorders), and at children who have mental disorders (in the form of treatment and rehabilitation).

Vital to the ongoing development and implementation of child mental health policy is the establishment of feedback loops, including information systems that facilitate the *monitoring and evaluation* of services, and the ongoing mental health status of key groups in the population. The extent of *ownership* of the policy by key stakeholder groups (particularly those who are expected to implement the policy, such as teachers and health workers) is crucial to its successful implementation.

Without this ownership and participation, policy is unlikely to be implemented. Thus, consultation with all key stakeholder groups forms three crucial functions:

1. to ensure that the policy document reflects the complexity and realities of child mental health needs in communities, through the contributions of relevant stakeholders;
2. to obtain the buy-in and ownership of the policy by those stakeholders; and
3. to reach consensus on the key policy issues, particularly when there are differences of opinion as to how the issues should be addressed.

All of these policy processes are usually located in *national, regional and international contexts*, which include global and regional policies, the political environment of the country, the socio-economic status and inequalities that may exist in that country, and specific cultural norms pertaining to gender, the status of children and the stigma against mental illness.

Current policy challenges and status

Key challenges facing child and adolescent mental health policy in Africa

The above conceptual framework provides a somewhat rational explanation of the complex process of child mental health policy development and implementation. But why does child mental health policy seldom follow this rational process and lead to the provision of well-resourced services that make a real impact on child and adolescent populations in Africa? And at what steps in the process of policy development and implementation does child mental health policy typically stumble?

To understand this, we need to critically examine each of the steps outlined in Figure 3.1. Beginning at the *policy development step*, a central problem is that child and adolescent mental health is simply not given adequate priority by stakeholders and key policy-makers. There are several reasons for the low priority of child mental health policy. Bird and colleagues have identified nine factors that affect the priority of mental health in African countries, which cluster around three categories: the legitimacy of the problem, the feasibility of the response and the support for the response.[5] A major driver remains ignorance among policy-makers and the general public about the scale of child mental illness in African countries and the international evidence for cost-effective interventions. Stigma, frequently a companion of ignorance, further exacerbates this and influences perceptions of the legitimacy of the problem, the feasibility of the response and the support for the response.[6]

5 Bird et al., 2011, pp. 357–365.

6 Kakuma et al., 2010, pp. 116–124; Kapungwe et al., 2010, pp. 192–203.

In addition to this, there are inherent problems with the stakeholders who may be involved in child mental health policy. Children and adolescents have limited capacity to advocate for themselves, particularly those with developmental or behavioural problems. Policy agendas are often driven by stakeholders who have power to influence those agendas, and children have little or no power in this regard. Thus, the crucial reliance on stakeholders to raise particular policy issues, and to do so in a sustained manner with sufficient political clout, means that usual policy processes overlook the needs of children and their mental health.

Secondly, in relation to the *policy implementation step*, there is often limited capacity within health services or education systems to implement child mental health policies. Mental health systems in Africa have inherited colonial-era psychiatric institutions that continue to consume a large proportion of national mental health budgets. The result is inadequately resourced mental health outpatient facilities. In the African region, there are 3.31 million people for every mental health outpatient facility, and 14 mental health outpatient visits per 100 000 people per year.[7] There is also limited capacity among health service managers, school curriculum developers, and education ministry managers to plan and deliver appropriate services. In addition, there are limited data on child and adolescent mental health needs and services. To our knowledge, there have been no nationally representative epidemiological studies conducted on infant or child mental health in any African country. There are major challenges to finding appropriate, culturally valid and reliable instruments to conduct such studies in Africa, and the information systems that should allow for the monitoring and evaluation of services are sparse or non-existent. One barrier to the generation of new knowledge on child mental health in Africa relates to the ethics of conducting research with children. Legislation may restrict child mental health research and ethics committees may discourage it. This protectionist approach (which is somewhat necessary given the vulnerabilities of children and adolescents) can be overzealous, and inhibit researchers and children from participating in research.

Thirdly, in relation to the *context*, although the needs for the survival of children and adolescents are clearly recognised in the Sustainable Development Goals (SDGs), their mental health needs are somewhat less visible. Many African countries are currently driven by the desire to achieve the targets set out in the SDGs, but these are largely focused on child and adolescent survival, with little attention paid to the developmental and behavioural challenges faced by children. Thus, the international policy context that drives many national agendas in African countries provides few signals to African ministries of health that they should be taking child mental health seriously as a health and economic development issue.

7 WHO, 2015.

Mapping current child mental health policy in African countries

We turn now to examine the current realities of child mental health policy in African countries. Between 2001 and 2014 there was a substantial increase in the percentage of African countries with a national mental health policy: from 47.8 per cent in 2001 to 50 per cent in 2010 and to 71 per cent in 2014.[8] Approximately 73 per cent of countries that do have mental health policies have additionally reformed their policies since 2000. This is likely to have been driven by international initiatives, such as those of the World Health Organization (WHO) following the World Health Report 2001, to encourage ministries of health to adopt and implement national mental health policies and plans. Approximately 71 per cent of countries in the WHO-AFRO region had mental health laws in 2001, however, this decreased to 55 per cent in 2014 (although this may be due to differences in definitions of what constitutes mental health laws or differences in the response rate to the WHO Atlas survey).[9] Less than 10 per cent of African countries have updated their mental health legislation in the last five years.[10] Many of the laws remain outdated and offer scant protection of human rights for people living with mental illness. Regarding substance abuse policy, 69 per cent of countries have substance abuse specifically mentioned in the general health policy or in the health development plan. However, only 50 per cent have a specific substance abuse plan and only 26 per cent of countries have specific funds allocated for substance abuse prevention and control.

Although these figures provide an overall indication of mental health policy in African countries, little is known about the extent to which these policies actually address the needs of children. In 2005, the WHO conducted the only Atlas study of child and adolescent mental health resources in the world,[11] but this has not been repeated. In this study, only 15 of the 46 African countries completed the Atlas questionnaire. Among these 15 countries, only 33 per cent (five countries) had a 'child-relevant' mental health policy, and only one country had a child and adolescent mental health programme. The report states: 'The countries with the highest proportion of children and adolescents in their populations are the countries most likely lacking in a child and adolescent mental health policy in any form.'[12]

On the African continent, only South Africa has subspecialist training that leads to a qualification as a child and adolescent psychiatrist. Furthermore, where services are available, they are frequently unaffordable; out-of-pocket expenditures account for 71.4 per cent of child mental health services where these are available in Africa,

8 Lund et al., 2010; WHO, 2001; 2011; 2015.
9 WHO, 2015.
10 WHO, 2015.
11 WHO, 2005a.
12 WHO, 2005a.

compared to 12.5 per cent in Europe.[13] Although these figures are now outdated, the evidence that we do have on the development of general mental health policies in Africa up to 2014 (reported earlier) seems to indicate that it is unlikely that this situation has changed in any substantial way in recent years.

In one of the few studies of its kind, Kleintjes and colleagues examined mental health policy and services in four African countries using qualitative and quantitative methods: Ghana, South Africa, Uganda and Zambia.[14] They found that, although all four countries had a mental health policy, either in draft form or formally adopted, the needs of children and adolescents were mentioned in only two of these policy documents, namely South Africa (1997) and Uganda (draft, 2000). In South Africa's case, standalone Child and Adolescent Mental Health Policy Guidelines have also been developed and adopted by the national Department of Health.[15] Children and adolescents are also included in the updated South African National Mental Health Policy Framework and Strategic Plan (2013–2020).[16]

When it comes to examining the implementation step in these four countries, none had included children in a national or provincial strategic plan for mental health. Thus, while two countries had a policy, there was no formal mechanism for implementing that policy, apart from the *de facto* services which may exist in the country. In relation to these, none of the four countries had outpatient facilities for child and adolescent mental health except for South Africa, which provides such services in only 1.4 per cent of health-care facilities.[17] In mental hospitals in Ghana, South Africa, Uganda and Zambia, only 4 per cent, 1 per cent, 0 per cent and 11 per cent of beds, respectively, are allocated to children and adolescents. None of these countries had mental health professionals in schools except South Africa, where the number was unknown.

Policies of international agencies

The low priority given to child and adolescent mental health in national policies on the African continent is reflective of the policies of international agencies that provide technical and economic aid to Africa. Child mental health is a low priority on the agendas of the World Bank, the Bill and Melinda Gates Foundation, the Global Fund and the US President's Emergency Plan for AIDS Relief (PEPFAR), and does not feature in any substantial way in their policy documents or funding initiatives.

13 WHO, 2005a.
14 Kleintjes et al., 2010, pp. 132–139.
15 Department of Health, 2003.
16 Department of Health, 2013.
17 Kleintjes et al., 2010, pp. 132–139.

However, there are welcome exceptions to this backdrop. International agencies such as the WHO continue to provide much-needed technical support to ministries of health,[18] and the UK's Department for International Development (DFID) has provided unique support for research on mental health policy development and implementation in Africa,[19] including child and adolescent mental health policy research.[20] Developments such as the Grand Challenges in Global Mental Health, which specifically identify child and adolescent mental health as a key priority,[21] offer hope that the current situation may change. This has been matched by research funding from the United States' National Institutes of Health, such as that for 'Saving Brains' in the LMICs and Grand Challenges Canada.

Child mental health and the SDGs

There are important commitments to mental health in the SDGs, which mark a major departure from the Millennium Development Goals (MDGs), in which mental health was completely absent. These changes are evident particularly in relation to SDG 3, which makes specific commitments to 'good health and well-being'. These include Target 3.4: 'By 2030, reduce by one-third premature mortality from non-communicable diseases through prevention and treatment and promote mental health and well-being,' and Target 3.5: 'Strengthen the prevention and treatment of substance abuse, including narcotic drug abuse and harmful use of alcohol.' These targets are critical for the inclusion of mental health care in the core package of health services financed through Universal Health Coverage.[22]

However, there is no specific mention of child and adolescent mental health in the SDGs. This is despite compelling arguments that child and adolescent mental health in Africa is implicit in many of the core international development challenges, such as poverty, universal primary education, child mortality and maternal health.[23] For example, there is clear evidence from Ethiopia that the mental health of children is adversely affected by economic deprivation.[24] Furthermore, interventions that target poverty can carry behavioural and developmental benefits for young children.[25]

Poor child mental health (attention-deficit/hyperactivity disorder, major depressive disorder and substance abuse) also predicts secondary school drop-out

18 WHO, 2005b.
19 Flisher, 2007, pp. 505–516.
20 Kleintjes et al., 2010, pp. 132–139.
21 Collins et al., 2011, pp. 27–30.
22 Thornicroft & Votruba, 2016, pp. 599–600.
23 Skeen et al., 2010, pp. 611–623.
24 Fekadu et al., 2006, pp. 954–959.
25 Fernald et al., 2008, pp. 828–837; Fernald et al., 2009, pp. 1997–2005; Fernald & Gunnar, 2009, pp. 2180–2189; Lund et al., 2011, pp. 1502–1514; Ozer et al., 2009, pp. 630–637.

in South Africa.[26] And there is emerging evidence for effective interventions. For example, a high quality pre-school programme from three to five years of age in Mauritius reduced conduct disorder and schizotypal symptoms at 17 years of age and criminal offences at 23 years of age.[27]

In relation to child mortality and maternal health, poor maternal mental health has been linked to a range of adverse infant outcomes in LMICs, including poor nutrition, stunting, early cessation of breastfeeding and diarrhoeal disease.[28] This is of particular concern in light of high rates of perinatal mental disorder found in some African countries (between 33 and 47 per cent).[29]

Yet despite these obvious links, child and adolescent mental health remains officially invisible in the SDGs, and therefore invisible to the key audiences involved in their implementation at regional and national levels.

Strategies for strengthening child mental health policy and its implementation

The above account paints a relatively bleak picture of child and adolescent mental health policy in Africa, and the extent to which children's mental health needs are taken seriously by policy-makers. Nevertheless, there is reason to be hopeful and there are grounds for believing that the situation can be improved. *The Lancet* series on Global Mental Health in 2011 provides evidence for action on child and adolescent mental health worldwide, summarising the evidence for the burden of child mental illness and cost-effective interventions in LMICs.[30] These include a range of universal and targeted prevention interventions as well as treatment interventions.

Furthermore, the WHO has developed a number of useful and practical guidelines for mental health policy and service development, including a specific module on Child and Adolescent Mental Health Policy and Plans.[31] This module provides a step-by-step approach to developing and implementing child and adolescent mental health policy, as laid out in Box 3.1, and draws on a number of successful case examples from countries around the world. Such tools are useful resources for ministries of health in African countries that are interested in developing and implementing child mental health policies.

26 Myer et al., 2009, pp. 354–356.
27 Raine et al., 2003, pp. 1627–1635.
28 Adewuya et al., 2008, pp. 191–193; Rahman et al., 2004, pp. 946–952.
29 Cooper et al., 1999, pp. 554–558; Rochat et al., 2006, pp. 1373–1378; Rochat et al., 2011, pp. 362–373.
30 Kieling et al., 2011, pp. 1515–1525.
31 WHO, 2005b.

Box 3.1: Steps in developing child mental health policy

1. **Developing a child and adolescent mental health policy**
   - Step 1: Gather information and data for policy development
   - Step 2: Gather evidence for effective strategies
   - Step 3: Undertake consultation and negotiation
   - Step 4: Exchange with other countries
   - Step 5: Develop the vision, values, principles and objectives of the policy
   - Step 6: Determine areas for action
   - Step 7: Identify the major roles and responsibilities of different stakeholders and sectors.
2. **Developing a child and adolescent mental health plan**
   - Step 1: Determine the strategies and time frames
   - Step 2: Set indicators and targets
   - Step 3: Determine the major activities
   - Step 4: Determine costs, available resources and the budget.
3. **Implementation of child and adolescent mental health policies and plans**
   - Step 1: Disseminate the policy
   - Step 2: Generate political support and funding
   - Step 3: Develop a supportive structure
   - Step 4: Set up pilot projects and demonstration areas
   - Step 5: Empower providers and maximise coordination.

Source: World Health Organization (WHO), 2005b

From these, and a number of other examples cited earlier, certain key strategies for strengthening child mental health policy development and implementation in Africa can be identified:

1. *Consult widely:* When developing mental health policies that pertain to children and adolescents, it is vital that ministries of health (or the institution leading the policy development) consult widely with a range of stakeholders. In the case of children and adolescents, as they frequently do not have the capacity to advocate for themselves, it is vital to consult with advocacy groups who represent their interests, and have a good understanding of child and adolescent developmental needs. Organisations that advocate for child rights

and child participation are particularly important, as illustrated in the work of the Children's Institute in South Africa.[32]

2. *Promote intersectoral collaboration:* Because of the many opportunities for mental health promotion and prevention outside of the traditional health sector (for example, through home-visitation programmes, pre-school programmes, and school-based programmes), it is vital to coordinate activities across these sectors. This needs to be coordinated at the national level. For example, ministries of Education, Health, Social Welfare, and Justice should develop coherent and complementary policies. Yet it is equally important at the local district and community levels, where, for example, developmental problems can be picked up at pre-school level and referred appropriately to the local clinic. In short, 'mental health is everybody's business' and government, NGOs and the private sector need to be coordinated with this philosophy in view.[33] Critical to achieving this is high level political support across sectors or ministries. This has been achieved in some high-income countries, for example, through the national Mental Health Commission in Canada, which has a mandate to act across sectors and mobilise resources for the attainment of mental health promotion and illness prevention objectives.
3. *Build on existing service resources and initiatives:* Freeman makes an appeal to use all opportunities to promote mental health issues on policy agendas, and provides a number of examples from South Africa, including the links between mental health and HIV, and the links between mental health and violence prevention initiatives in schools, both of which are major political priorities in the country.[34] In Brazil, an annual immunisation programme, 'Babies' week', is used to screen young children for developmental problems, who are then followed up with home or clinic visits.[35]
4. *Use the best available evidence:* In Africa, the evidence on current policy and service realities as well as cost-effective interventions for child mental health is particularly thin. Nevertheless, frameworks for child and adolescent mental health services have been developed,[36] and the 2011 *Lancet* series provides a substantial review of epidemiology and current interventions.[37] It is vital to build the evidence base for cost-effective interventions for mental health promotion, prevention and treatment going forward. In keeping with the

32 Jamieson et al., 2011.
33 Skeen et al., 2010, pp. 611–623; pp. 624–663.
34 Freeman, 2000, p. 508.
35 WHO, 2005b.
36 Lund et al., 2009, pp. 1121–1130.
37 Kieling et al., 2011, pp. 1515–1525.

recommendations of Kieling and colleagues, these should target risk and protective factors for child mental health in the particular setting in which the intervention is to be delivered.[38]

5. *Build the capacity of policy-makers to develop and implement child mental health policy:* Several initiatives in Latin America and the Caribbean have shown that building regional networks of policy-makers can contribute to the strengthening of national mental health systems.[39] Training programmes in public mental health and in mental health policy have been established at the University of Lisbon and the University of Cape Town. These initiatives need to be strengthened, and support provided for students from a range of African countries to attend such programmes to build capacity in the region.
6. *Link policy to strategic plans with clear indicators of implementation and adequate resources:* As mentioned earlier in this chapter, policies frequently stumble at the implementation stage due to poorly formulated plans and weak implementation systems. It is vital that plans clearly set out meaningful and achievable targets, with indicators, timeframes and resources linked to each target. The WHO module on Child and Adolescent Mental Health Policies and Plans provides examples and a template for these plans, which can be used and adapted readily by African ministries of health.[40]
7. *Monitor and evaluate policy implementation:* If policies and strategic plans are well designed, they should provide clear indicators for the extent to which their objectives have been achieved. To do this, information systems and reporting lines need to be established to monitor and evaluate whether the target of the policy has been achieved. The WHO has also developed a document describing the process of developing and implementing mental health information systems, which provides practical guidelines that can assist ministries of health with this task.[41]
8. *Lobby international development and aid agencies:* As noted earlier, many international development agencies do not give adequate attention to child and adolescent mental health. However, there are signs that this may be changing. Strong and united appeals from African countries for attention to be paid to the mental health needs of children and adolescents are required to support this change.

38 Kieling et al., 2011, p. 1515–1525.
39 Caldas de Almeida & Horvitz-Lennon, 2010, pp. 218–221.
40 WHO, 2005b.
41 WHO, 2005c.

Conclusion

This chapter has provided a framework for the development and implementation of child and adolescent mental health policy in African countries; identified some of the key challenges in this process; described the current status of child mental health policies, including their links with international policy agendas and the SDGs; and finally made recommendations for how policy can be strengthened.

A crucial component in every aspect of this process is leadership. Action is needed now to identify and strengthen leaders who can be champions for child and adolescent mental health on the continent. Such leadership requires a combination of a good technical understanding of the issues, self-belief, diplomacy and a capacity to articulate the needs of a wide range of stakeholders. Mentorship and support for the leaders of tomorrow is crucial in this process.

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References

Adewuya, A.O., Ola, B.O., Aloba, O.O., Mapayi, B.M. & Okeniyi, J.A. (2008). Impact of postnatal depression on infants' growth in Nigeria. *Journal of Affective Disorders*, 108 (1–2), 191–193.

Bird, P., Omar, M., Doku, V., Lund, C., Nsereko, J.R. & Mwanza, J. (2011). Increasing the priority of mental health in Africa: Findings from qualitative research in Ghana, South Africa, Uganda and Zambia. *Health Policy and Planning*, 26(1), 357–365.

Caldas de Almeida, J.M. & Horvitz-Lennon, M. (2010). Mental health care reforms in Latin America: An overview of mental health care reforms in Latin America and the Caribbean. *Psychiatric Services*, 61, 218–221.

Collins, P.Y., Patel, V., Joestl, S.S., March, D., Insel, T.R. & Daar, A.S. (2011). Grand challenges in global mental health. *Nature*, 472(July), 27–30.

Cooper, P.J., Tomlinson, M., Swartz, L., Woolgar, M., Murray, L. & Molteno, C. (1999). Post-partum depression and the mother-infant relationship in a South African peri-urban settlement. *British Journal of Psychiatry*, 175, 554–558.

Department of Health. (2003). *National Policy Guidelines for Child and Adolescent Mental Health*. Pretoria: Department of Health. Retrieved from: http://www.gov.za/sites/www.gov.za/files/childmentalhealth_0.pdf

Department of Health. (2013). *National Mental Health Policy Framework and Strategic Plan (2013–2020)*. Pretoria: Department of Health. Retrieved from: https://www.health-e.org.za/wp-content/uploads/2014/10/National-Mental-Health-Policy-Framework-and-Strategic-Plan-2013-2020.pdf

Fekadu, D., Alem, A. & Hägglöf, B. (2006). The prevalence of mental health problems in Ethiopian child laborers. *Journal of Child Psychology and Psychiatry*, 47(9), 954–959.

Fernald, L.C.H., Gertler, P.J. & Neufeld, L.M. (2008). Role of cash in conditional cash transfer programmes for child health, growth and development: An analysis of Mexico's Oportunidades. *The Lancet*, 371(9615), 828–837.

Fernald, L.C.H., Gertler, P.J. & Neufeld, L.M. (2009). 10-year effect of Oportunidades, Mexico's conditional cash transfer programme, on child growth, cognition, language and behaviour: A longitudinal follow-up study. *The Lancet*, 374(9706), 1997–2005.

Fernald, L.C.H. & Gunnar, M.R. (2009). Poverty-alleviation program participation and salivary cortisol in very low-income children. *Social Science and Medicine*, 68(12), 2180–2189.

Flisher, A.J., Lund, C., Funk, M., Banda, M., Bhana, A., Doku, V., … Omar, M. (2007). Mental health policy development and implementation in four African countries. *Journal of Health Psychology*, 12(3), 505–516.

Freeman, M. (2000). Using all opportunities for improving mental health examples from South Africa. *Bulletin of the World Health Organization*, 78(4), 508.

Jamieson, L., Bray, R., Viviers, A., Lake, L., Pendlebury, S. & Smith, C. (2011). *South African Child Gauge 2010/11*. Cape Town: Children's Institute, University of Cape Town.

Kakuma, R., Kleintjes, S., Lund, C., Drew, N., Green, A. & Flisher, A.J. (2010). Mental health stigma: What is being done to raise awareness and reduce stigma in South Africa? *African Journal of Psychiatry*, 13(2), 116–124.

Kapungwe, A., Cooper, S., Mwanza, J., Mwape, L., Sikwese, A., Kakuma, R., … Flisher, A.J. (2010). Mental illness-stigma and discrimination in Zambia. *African Journal of Psychiatry*, 13(3), 192–203.

Kieling, C., Baker-Henningham, H., Belfer, M., Conti, G., Ertem, I., Omigbodun, O., … Rahman, A. (2011). Child and adolescent mental health worldwide: Evidence for action. *The Lancet*, 378(9801), 1515–1525.

Kleintjes, S., Lund, C. & Flisher, A.J. (2010). A situational analysis of child and adolescent mental health services in Ghana, Uganda, South Africa and Zambia. *African Journal of Psychiatry*, 13(2), 132–139.

Lund, C. (2010). Mental health in Africa: Findings from the Mental Health and Poverty Project. *International Review of Psychiatry*, 22, 547–549.

Lund, C., Boyce, G., Flisher, A.J., Kafaar, Z. & Dawes, A. (2009). Scaling up child and adolescent mental health services in South Africa: Human resource requirements and costs. *Journal of Child Psychology and Psychiatry*, 50(9), 1121–1130.

Lund, C., De Silva, M., Plagerson, S., Cooper, S., Chisholm, D., Das, J., … Patel, V. (2011). Poverty and mental disorders: Breaking the cycle in low-income and middle-income countries. *The Lancet*, 378(9801), 1502–1514.

Lund, C., Van Heyningen, T. & Majavu, M. (2010). *Evaluation of the WHO AFRO Regional Strategy for Mental Health (2000–2010). Report for the African Regional Office of the World Health Organization*. Cape Town: Department of Psychiatry and Mental Health, University of Cape Town.

Myer, L., Stein, D.J., Jackson, P.B., Herman, A.A., Seedat, S. & Williams, D.R. (2009). Impact of common mental disorders during childhood and adolescence on secondary school completion. *South African Medical Journal*, 99(5), 354–356.

Ozer, E.J., Fernald, L.C.H., Manley, J.G. & Gertler, P.J. (2009). Effects of a conditional cash transfer program on children's behavior problems. *Pediatrics*, 123(4), 630–637.

Patel, V., Flisher, A.J., Nikapota, A. & Malhotra, S. (2008). Promoting child and adolescent mental health in low and middle income countries. *Journal of Child Psychology and Psychiatry*, 49(3), 313–334.

Rahman, A., Iqbal, Z., Bunn, J., Lovel, H. & Harrington, R. (2004). Impact of maternal depression on infant nutritional status and illness: A cohort study. *Archives of General Psychiatry*, 61(9), 946–952.

Raine, A., Mellingen, K., Liu, J., Venables, P. & Mednick, S.A. (2003). Effects of environmental enrichment at ages 3–5 years on schizotypal personality and antisocial behavior at ages 17 and 23 years. *American Journal of Psychiatry*, 160(9), 1627–1635.

Rochat, T.J., Richter, L.M., Doll, H.A., Buthelezi, N.P., Tomkins, A. & Stein, A. (2006). Depression among pregnant rural South African women undergoing HIV testing. *Journal of the American Medical Association (JAMA)*, 295(12), 1373–1378.

Rochat, T.J., Tomlinson, M., Bärnighausen, T., Newell, M.-L. & Stein, A. (2011). The prevalence and clinical presentation of antenatal depression in rural South Africa. *Journal of Affective Disorders*, 135(1), 362–373.

Skeen, S., Kleintjes, S., Lund, C., Petersen, I., Bhana, A. & Flisher, A.J. (2010). 'Mental health is everybody's business': Roles for an intersectoral approach in South Africa. *International Review of Psychiatry*, 22(6), 611–623.

Skeen, S., Lund, C., Kleintjes, S. & Flisher, A. (2010). Meeting the Millennium Development Goals in sub-Saharan Africa: What about mental health? *International Review of Psychiatry*, 22(6), 624–631.

Thornicroft, G. & Votruba, N. (2016). Does the United Nations care about mental health? *Lancet Psychiatry*, 3(7), 599–600.

World Health Organization (WHO). (2001). *Atlas: Mental Health Resources in the World*. Geneva: World Health Organization. Retrieved from: http://apps.who.int/iris/handle/10665/66910

World Health Organization (WHO). (2005a). *Atlas: Child and Adolescent Mental Health Resources*. Global concerns: Implications for the future. Geneva: World Health Organization. Retrieved from: http://www.who.int/mental_health/resources/Child_ado_atlas.pdf

World Health Organization (WHO). (2005b). *Child and Adolescent Mental Health Policies and Plans. Mental Health Policy and Service Guidance Package*. Geneva: World Health Organization. Retrieved from: http://www.who.int/mental_health/policy/Childado_mh_module.pdf

World Health Organization (WHO). (2005c). *Mental Health Information Systems. Mental Health Policy and Service Guidance Package*. Geneva: World Health Organization. Retrieved from: http://www.who.int/mental_health/policy/mnh_info_sys.pdf

World Health Organization (WHO). (2011). *Mental Health Atlas* 2011. Geneva: World Health Organization. Retrieved from: http://apps.who.int/iris/bitstream/10665/44697/1/9799241564359_eng.pdf

Chapter 4

Cross-cutting issues for child development in Africa

Stefan Germann, Jane Chege, Jennifer Franz-Vasdeki & Mesfin Loha

Introduction

Despite making significant progress, the Millennium Development Goals' (MDGs) child mortality targets were not achieved by 2015. According to the World Health Organization (2015), at the end of the MDGs, almost six million children died before their fifth birthday from primarily preventable deaths. Most countries in Africa missed their MDG child mortality targets.[1] The new Sustainable Development Goals (SDGs), especially Goal 3, target 2, still focuses on reducing preventable deaths of newborns and children under five years of age and aims to reduce neonatal mortality to at least 12 per 1 000 live births and under-five mortality to at least 25 per 1 000 live births. To achieve the new SDG health-related goals, most countries in Africa will require renewed and increased multisectoral leadership and increased investments in health and health-related sectors such as nutrition, water/sanitation/hygiene (WASH), as well as education, especially girls' secondary education.[2]

To increase the chance of survival for children and women around the world and to make a concerted effort to improve access to family planning, ante-natal/post-natal care, vaccines, nutrition and treatment of preventable diseases such as pneumonia, diarrhoea, malaria and tuberculosis, the Global Strategy for Women's and Children's and Adolescents' Health, 2016–2030, was launched in 2015 by the UN Secretary General, called Every Women, Every Child, Every Adolescent, Everywhere. This strategy, based on an agreed continuum of care,[3] was designed to increase cooperation in improving women's and children's health among government, international organisations and non-governmental organisations (NGOs), in light of the shortfalls in reaching the MDGs 4 and 5.[4] This strategy states that women and children play a crucial role in development, and that investing in women's and children's health has the potential to build stable, peaceful and productive societies.

1 WHO, 2015.
2 United Nations (UN), 2016.
3 Partnership for Maternal, Newborn and Child Health, 2009a.
4 Ki-Moon, 2010.

For those children who survive infancy and childhood, improving the quality of early years will ultimately determine their long-term well-being, development and opportunities. Investing in women's and children's health reduces poverty, stimulates economic productivity and growth, is cost-effective, and allows women and children to realise their full potential.[5] However, investment alone does not necessarily result in improved health outcomes; money needs to be directed towards scaled-up, cost-effective, proven health interventions.[6]

A key determinant of long-term health is infant and child mental health and underlying nutritional issues that impact child mental health, although these remain poorly understood.[7] For example, where undernutrition is a significant problem, evidence has shown that brain development of children is particularly responsive to interventions which combine food supplementation and psychosocial stimulation.[8]

Richter points to the importance of increasing knowledge around infant mental health, as well as improving our understanding of the direct and indirect mechanisms of poverty on child development to adequately address the effects of underdevelopment on infants and children.[9] In particular, Richter highlights three main mechanisms for improving infant mental health in conditions of poverty, including improving nutrition, reducing maternal depression and addressing the institutionalisation of infants and children, especially in light of the HIV/AIDS epidemic.[10]

Infant and child development is determined by a range of environmental, social and economic factors. Interwoven throughout this chapter are some of the key challenges to infant and child development in Africa, particularly in the context of other health concerns, including malnutrition, HIV/AIDS and non-communicable diseases (NCDs), including mental health.

This chapter highlights Bronfenbrenner's ecological model of child development,[11] then addresses the major challenges for ensuring healthy development for children. In this respect, it looks at health systems strengthening, particularly in Africa, before examining child health and development practices from a programming perspective at the community and local levels. Lastly, it addresses mental health and psychosocial support as determinants of child development.

5 Ki-Moon, 2010.
6 Harmonization for Health in Africa (HHA), 2011.
7 Pope et al., 2010, pp. 70–81.
8 WHO, 2008b.
9 Richter, 2003, pp. 243–248.
10 Richter, 2003, pp. 243–248.
11 Bronfenbrenner, 1979, p. 844.

Children in context

Bronfenbrenner's ecological model of child development traces the relationships of different stakeholders in relation to the child.[12] The theory, also known as the ecological theory of human development or development in context theory, has been widely employed to understand the influence of external factors on development.[13] Because children live in families and communities, their lives are influenced by factors from the local to the international environments. Most ecological models of human development acknowledge the influences of child (e.g., temperament), family (e.g., parenting style), and community (e.g., violence exposure) factors on the developmental trajectories of children.[14] The model, shown in Figure 4.1, is also widely accepted as the current best framework for understanding the impact of maltreatment on the outcome and behaviour of the child, and serves as a guiding structure to help identify how responsible stakeholders (such as adults, professionals and government) can support the holistic development of children *and* embed child rights in their approaches and practices.[15]

Bronfenbrenner proposed that human development, especially for infants and children, occurs through a progressively more complex process of reciprocal interactions between people and objects in one's environment.[16] The quality of relationships of those interacting with children is essential for children to thrive in a protected and caring context. The child ecology model conceptualises how the child contributes to his or her social environment at all levels, while simultaneously being affected and served by it, thus highlighting the interconnectedness between responsibilities and reciprocities leading to child well-being and societal well-being.

The conceptualisation of the citizenship of the child is intrinsic to our discussion of rights and responsibilities within the ecology of the child. As a result, children's upbringing should focus on them realising their rights as citizens, with the assistance of adults, who need to be supported in that duty by the state.[17] While this process may vary by child and by culture, it needs to be done in a publicly accountable way, whereby the child should never lose citizenship rights and entitlements, starting with the right to life, survival and development. Childhood, however, must maintain a special status; treating children as equal citizens does not mean that they are 'little adults'. It is critical that children are regarded as people in the process of becoming adults from the day that they are born, and do not embark on this process only when they turn a certain age.[18]

12 Bronfenbrenner, 1979, p. 844; Bronfenbrenner & Morris, 1998, pp. 993–1028.
13 Bronfenbrenner, 1994, pp. 37–43; Bronfenbrenner & Morris, 1998, pp. 993–1028.
14 Bradshaw et al., 2006.
15 Patel et al., 2007, pp. 1302–1313.
16 Bronfenbrenner, 1994, pp. 37–43.
17 Bronfenbrenner, 1994, pp. 37–43; McLeroy et al., 1988, pp. 351–377.
18 Germann, 2005.

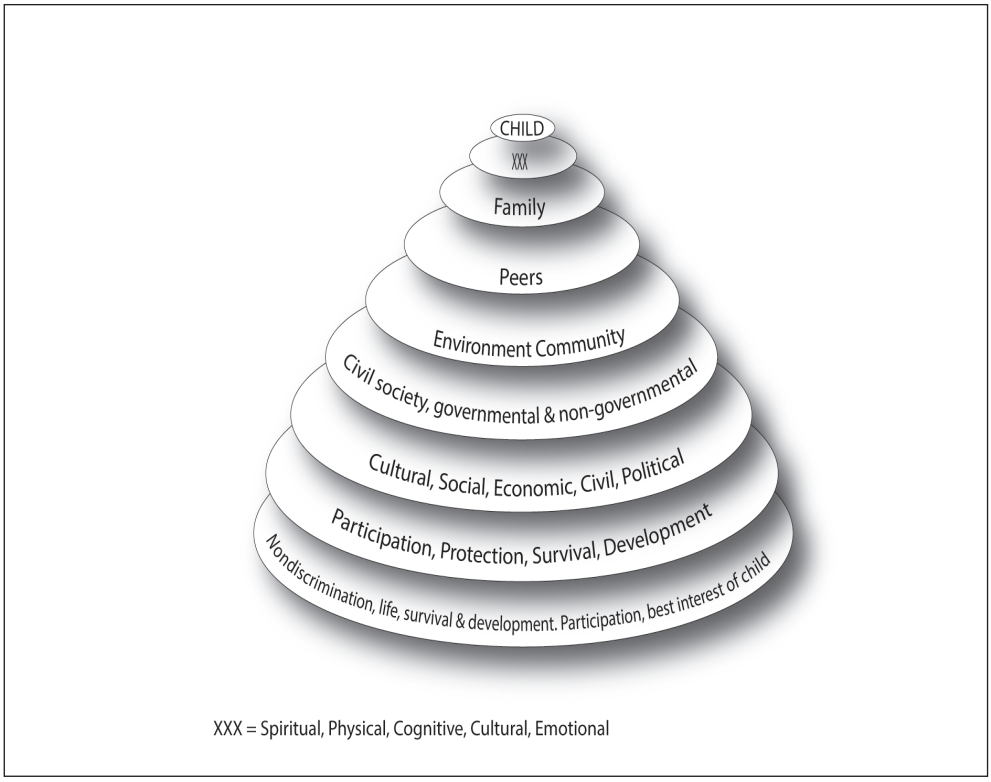

Figure 4.1: A child rights ecology

Source: Institute of Child Rights and Development, University of Victoria, BC, Canada[19]

Infancy and early childhood are the most important time in a person's life in terms of development.[20] Healthy early child development includes physical, social/emotional, language and cognitive development, which collectively influences long-term well-being, including mental and physical health over a lifetime. Within the microsystem of the ecological model, family is arguably one of the most important components of early child development and is crucial not only to child survival, but also to opportunities for learning experiences and lifelong well-being. It has been shown

19 IICRD, 2017.

20 Evans, 2006.

that the best people to support children are their parents, and even if not all children are raised by their parents, they still require quality caregiving.[21]

To encourage parental support and care for children, it is crucial to provide appropriate and accessible resources, both in the form of education and support programmes.[22] High quality intervention programmes can give parents the necessary information to make a real difference in their children's lives, as well as their own. Programmes designed to work with parents and children to improve childhood health and well-being should combine several interventions, including those that support psychological development, maternal health[23] and long-term, integrated nutrition interventions, such as those that focus on reducing micronutrient deficiencies.[24]

Strengthening health care: Reconsidering the system

While maternal and child deaths have, indeed, fallen around the world over recent decades, due to both advances in development and health interventions, deaths from largely preventable causes remain unacceptably high, especially in sub-Saharan Africa.[25] Child survival interventions are not reaching those who need them most and even where coverage has improved, there remains a large gap between what can be done to reduce child mortality and what is actually being done.[26] Significantly reducing infant and child mortality is part of the SDGs, as well as improving the long-term development opportunities for all children. The SDGs are the new over-arching 'development framework' and within this framework, it is widely recognised that most of the SDGs cannot be achieved without efforts designed to strengthen health systems, including increased health promotion, given the rapid increase in non-communicable diseases (NCDs) that, if left unchecked, may undermine past health gains.[27]

An ecological approach focuses on child development influenced by the social environment, as well as systems operating outside the household. There is evidence that interventions designed to produce change in the social environment (i.e., in

21 Evans, 2006.
22 Brown et al., 1998, pp. 1–24; Evans, 2006.
23 WHO, 1999.
24 Berti et al., 2010, pp. 613–629; MacDonald et al., 2011, 137–149.
25 Bryce et al., 2003, pp. 159–164.
26 Bhutta et al., 2010, pp. 2032–2044.
27 Dodd & Cassels, 2006, pp. 379–387.

effective, efficient and accessible health services provision) will, in turn, produce changes in individuals—both in terms of behaviour and health outcomes.[28] Nonetheless, low- and middle-income countries (LMICs) continue to suffer from a double problem of failing health systems and a high rate of communicable and non-communicable diseases.[29] While there are affordable and effective interventions available for the most common health problems, including funding for the 'Big Three' (tuberculosis, malaria and HIV), there remains a 'bottleneck' in the LMICs to achieve the SDGs, primarily due to 'fragile and fragmented' health delivery services.[30]

In Africa, health systems are not meeting basic standards of care primarily due to system-wide barriers to care delivery. The Touch Foundation has conducted a representative study designed to understand specific impediments to effective care delivery and the necessary actions required to overcome such impediments in north-western Tanzania.[31] Looking at how an improved use of clinical pathways could lead to health system strengthening, the study mapped care delivery in four areas, including maternal and child health, trauma and malaria prevention and treatment. The study was novel in its focus, not on horizontal or vertical health management, but in moving beyond these issues to understand significant barriers to effective care and in proposing concrete solutions to overcome such barriers; the results are applicable to any health system in the region, thereby making the findings of broad interest.[32]

Other studies have similarly highlighted the shortage of trained medical staff throughout Africa as a major barrier to health systems strengthening in the region, including gaps in service coverage and inappropriate skill mixes; there is an estimated shortage of over 800 000 doctors, nurses and midwives, mainly due to chronic underinvestment in health systems, particularly in skilled labour.[33] Ineffective systems of monitoring and accountability may also be partially responsible for high rates of under-five mortality, particularly in resource-poor settings. Community-based monitoring can increase the quality and quantity of primary health provisions as the feeling of ownership and responsibility among the community itself increases and citizens hold providers accountable for how resources are utilised. In Uganda, community-based monitoring of public health-care providers has been shown to lead to a significant increase in the use of facilities and a reduction in child mortality.[34]

28 Brown et al., 1998, pp. 1–24.
29 Abegunde et al., 2007, pp. 1929–1938; Chen, 2004; Engle et al., 2007, pp. 229–242.
30 Travis et al., 2004, pp. 900–906.
31 Touch Foundation, 2012.
32 Bryan et al., 2009, pp. 80–95.
33 Awases et al., 2010, pp. 22–29; Coovadia et al., 2009, pp. 817–834.
34 Bjorkman & Svensson, 2009, pp. 735–769.

By and large, LMICs follow a model whereby government plays a dominant role in the finance and delivery of health services, with an implicit goal of providing low or no cost health care to users.[35] In reality, however, there is a high level of private, out-of-pocket spending on health care, with the poor spending a higher share of their income on health-care services than the wealthy.[36] There is evidence that LMICs need to 'rethink' health-care system policies, recognising, for example, the role played by NGO providers.[37] For example, in Cambodia, one study found that contracting with NGOs for the provision of health services increased access among the poorest share of the population, while out-of-pocket expenditures fell dramatically.[38]

Task shifting is another approach to strengthening delivery arrangements in health systems, whereby health workers with shorter training and qualifications are used.[39] The use of lay workers has shown an increase in the uptake of childhood immunisations, the promotion of breastfeeding, and a reduction in child mortality and morbidity from common childhood illnesses in the LMICs.[40] Specialist outreach clinics have also shown significant potential in the LMICs; such clinics can improve access to care and quality and thus health outcomes and patient satisfaction, although there is evidence they may be more expensive.[41]

Where strides have been made in transforming previously 'dysfunctional' health systems in Africa, such as in South Africa where an integrated, comprehensive national health system is in place, implementation of effective policies remains hindered by ineffective and weak leadership and stewardship, and there remains a human-resource crisis.[42] Additionally, the HIV epidemic has placed an extra strain on health services throughout Africa, especially on the health-care workforce, and threatens to slow development even further in the most resource-constrained settings.[43]

Two separate but complementary components of health systems strengthening are delivery strategies and interventions. There is a need for more rigorous assessments of alternative delivery strategies and mechanisms for specific public health interventions,[44] as well as programmes to examine community-based health workers who can provide continuous delivery of family-planning services, health-seeking

35 Berman, 1998, pp. 1463–1479.
36 Berman, 1997, pp. 11–30.
37 Lewin et al., 2008, pp. 928–939.
38 World Bank, 2004.
39 WHO, 2007.
40 Lewin et al., 2008, pp. 928–939.
41 Gruen et al., 2006, pp. 130–138; Gruen et al., 2004, pp. 1–71.
42 Coovadia et al., 2009, pp. 817–834.
43 Wakabi, 2011, pp. 2167–2168.
44 Victoria et al., 2004, pp. 1541–1548.

advice, and community case management of a range of diseases, from malaria to pneumonia, depending on government policies.[45] Furthermore, institutions already present in a community, such as NGOs and religious groups, may be able to provide resources otherwise unavailable to individuals and families in deprived settings.

Child health and development practices and programming at the community level

Children's rights are often compromised even before they are born, with children starting life in an already precarious situation due to inadequate care. Appropriate policy development is essential to sustainable financing of early child development programmes at every level of programming. According to the United Nations Children's Fund (UNICEF), comprehensive Early Childhood Care and Development (ECCD) policies require, above all, acceptance, funding and implementation. Ghana stands out as a pioneer in ECCD policy development in Africa as they have established ECCD systems for all children, ensuring training of ECCD practitioners, including parents, and have made progress in addressing the rising orphan and vulnerable children crisis in light of the HIV/AIDS epidemic.[46] Programmes in the area, focusing on health and nutrition for children under five years and the establishment of child-friendly services, and local capacities for peace, all contribute to the government's efforts to scale up ECCD in the country. In September 2016, at the UN General Assembly, a new global effort called the global BabyWASH Coalition (www.babywashcoalition.org) was launched with the aim of providing governments and programme staff with guidelines on how better to integrate efforts for health, nutrition, WASH and ECCD.[47]

More than 53 million children are orphans in sub-Saharan Africa, with more than 30 per cent of these due to AIDS.[48] While many programmes of care and support for orphans or vulnerable children (OVC) have focused on meeting basic physical needs of children, there remains an enormous unmet need in the psychological care and protection of children. There is a great need, therefore, for governments and humanitarian organisations to provide support across a range of sectors,[49] thus linking health and social welfare programmes, with less focus on material provision alone.

Particularly in light of the HIV/AIDS epidemic, a large number of the world's

45 Engle et al., 2007, pp. 229–242.
46 Deters & Bajaj, 2008; UNICEF, 2006.
47 World Vision International, 2010.
48 UNICEF, 2006.
49 UNICEF, 2006.

children are deprived of their biological parents, making it even more urgent for caregivers to receive support.[50] The most vulnerable children show the greatest response to interventions, particularly those designed to provide education on tradition, child development milestones and cognitive development techniques.[51] *The Journey of Life* (*JoL*),[52] an African psychosocial support initiative, which facilities community conversations to enhance child care and development, was developed to encourage reflection, dialogue and action among all people who interact with children and who can contribute to their care, support and protection. This includes children and caregivers, but also parents, neighbours, classmates, religious and traditional leaders, professionals (e.g., police, teachers and nurses), counsellors and community workers. The *JoL* promotes the idea that many communities can do, and are doing, a lot for vulnerable children without excessive reliance on outside agencies. The *JoL* seeks to strengthen/build community responses and works with the idea that families and communities have the strength and capacity to care for their 'own' children, but need to understand their limitations and find the best use of their own resources. It is a non-prescriptive, fun, simple and non-technical approach that makes use of drama, art, dance and song.[53]

Universal birth registration

Birth registration opens doors to other rights through the provision of age-related protection from exploitation and abuse, and is considered the 'first' right afforded to a child as it is the right to an official identity and allows a child to be recognised under law and enjoy a nation's privileges and services.[54] The SDGs have the ambitious target (No. 16.9) to 'Provide legal identity to all, including birth registration, by 2030'. However, millions of children every year are not registered and 55 per cent of all births in sub-Saharan Africa remain unrecorded.[55] According to the African Child Policy Forum,[56] resistance to birth registration can be linked primarily to traditional perceptions. Birth registration in Africa originated when colonial administrations, such as in East Africa, made it compulsory for non-Africans to register births. After independence, many countries, including Uganda, Kenya, Zambia and Zimbabwe, adapted these colonial instruments to implement national legislation with uniform application.

50 Evans, 2006.
51 WHO, 1999.
52 REPSSI, 2004.
53 Brakarsh, 2008.
54 Deters & Bajaj, 2008.
55 UNICEF, 2005.
56 Bequele, 2005, pp. 1–25.

In addition to age-related abuse, such as early marriage or forced recruitment in military service, children who remain without a birth certificate can suffer in other important ways, including reduced access to health care and education. In addition, orphans without proper identification may lose access to parental property.[57]

World Vision Mozambique conducted a free birth registration campaign in 2010, covering the districts of Muecate and Murrupula in the Nampula Province. Through the campaign, over 61 000 people (including 75 per cent of the children in the area) from remote communities were able to have their birth registered for free. As part of a local-level advocacy project, the campaign involved mobile brigades and 20 local community leaders who conducted awareness-raising sessions on birth registration policy.[58] This has resulted in a marked improvement in recorded birth registration in Mozambique. [59]

Nutrition and feeding practices

Malnutrition, especially undernutrition, is the main underlying cause of death in African children under five years of age. Good nutrition is one of the most important ingredients to the optimal physical growth and psychological development of children. The major causes of undernutrition in Africa include poor breastfeeding and complementary feeding practices, poor dietary quality, inadequate intake of micronutrients, poor maternal health care, a high prevalence of HIV and other infectious diseases, inadequate hygiene and sanitation practices, and food insecurity.[60] These multiple burdens result in unacceptably high levels of chronic and acute malnutrition. Current programming approaches in many sub-Saharan countries with high levels of malnutrition emphasise direct interventions early in life to prevent chronic malnutrition in children. At least 20 countries worldwide have recorded gains of more than 20 percentage points over 10 years in the rates of exclusive breastfeeding of infants aged zero to six months; factors for success, in general, appear to be the large-scale implementation of comprehensive, multi-level programmes to protect, promote and support breastfeeding, with strong government leadership and broad partnerships.[61]

An excellent example of a cost-effective, inexpensive, highly effective health practice is Kangaroo Mother Care. The technique was started in Columbia over 30 years ago and can now be found in both high- and low-income countries all over the world. The approach emphasises the benefits of wrapping low-birth-

57 Bequele, 2005, pp. 1–25.
58 World Vision International, 2010.
59 Work Vision UK (WVUK), 2011.
60 Black et al., 2008, pp. 243–260.
61 UNICEF, 2011.

weight infants (under 2 000 grams and/or 32 weeks of age) to the bare chest of the mother or care provider for warmth. The presence of skin-to-skin contact keeps the newborn warm with easy access to food.[62] Results from around the world have shown that Kangaroo Mother Care is at least equivalent to conventional care (i.e., incubators), that it can facilitate breastfeeding and improve bonding between mother and baby, and is especially important in LMICs where expensive equipment may be unavailable.[63] Furthermore, a long-term follow-up study has found that Kangaroo Mother Care has significant, long-lasting positive effects on an at-risk individual's IQ and home environment, and on a caregiver's protectiveness and nurturance, 20 years post-intervention.[64] Results from Zimbabwe[65] and Mozambique[66] have shown an increase in hospital survival of low-birth-weight infants by as much as 90 per cent in hospitals without incubators but using Kangaroo Mother Care. Currently, the newly established Global Finance Facility (GFF), hosted by the World Bank Group and aimed at increasing investments for women's, children's and adolescents' health is developing a Development Impact Bond (an innovative finance instrument) to scale up Kangaroo Care nationally in Cameroon.[67]

Although breastfeeding is widely practised and accepted, many newborns and infants still miss its full benefits. The best way to good infant and young child nutrition starts with taking care of the pregnant woman and following through with age-appropriate and context-specific programmes for infants and toddlers. For example, in Ethiopia, the national strategy for infant and young child feeding of 2004,[68] and the later national nutrition strategy in 2008,[69] both emphasise addressing issues of infant and young child feeding during the first year of life, particularly promoting optimal breastfeeding practices. The strategy also focuses on addressing maternal malnutrition to tackle intergenerational effects. This and other interventions focus on the promotion of essential nutrition action, with improving the nutritional status of women and child-growth monitoring. Refocusing approaches and resources to direct interventions early in life are showing promising results in improving nutritional status.

Malawi is a country with persistently high levels of stunting and HIV rates, but one with exemplary results in reducing rates of underweight infants and children. Strengthening a multisectoral approach to nutrition programming, including water-related and education ministries, and supporting ministries of health to mainstream

62 Ruiz-Pelaez et al., 2004, pp. 1182–1183.
63 WHO, 2003.
64 Charpak et al., 2016.
65 Bergman & Jurisoo, 1994, pp. 57–60.
66 Lincetto et al., 2000, pp. 293–295.
67 Global Financing Facility (GFF), 2016.
68 Ministry of Health, 2004.
69 Ministry of Health, 2008.

nutrition, is critical to successful programming. Countries with improved and functioning early warning and surveillance programmes are better placed to respond to and address emerging issues.[70]

Non-communicable diseases (NCDs)

Africa faces a triple burden of infections, chronic NCDs and injuries. Although infectious diseases still account for more than two-thirds of deaths on the continent, chronic diseases pose a major threat to health. It is projected that over the next 10 years Africa will experience the largest increase in death rates from cardiovascular and respiratory disease, cancer and diabetes.[71]

As people 'rise up the food chain', leading to a health transition (or epidemiological transition), especially in urban areas, chronic diseases begin to dominate the use of health services and resources. In Africa, morbidity and mortality from chronic diseases related to this transition are taking up a substantial proportion of hospital beds and health resources—often exceeding the costs of undernutrition in LMICs.[72]

Maternal and child health are inextricably linked with the prevention and control of NCDs.[73] NCDs are a neglected global health issue with significant social and economic impact at the international, national and household levels.[74] In Africa, deaths from NCDs are rising faster than anywhere in the world and LMICs are disproportionately affected. In 2007, 50 per cent of the total disease burden in 23 LMICs was due to NCDs.[75] If countries were able to reduce an additional 2 per cent in mortality rates from NCDs, approximately 24 million deaths worldwide could be averted. Reducing the burden of disease associated with NCDs requires governments to improve information and education to reduce risk of chronic diseases, as well as increase access to preventative treatment and services, especially among the poor.

Mental health: Happy parent, healthy children

Mental health, another NCD, has long been neglected in LMICs and there remains a paucity of mental health research in Africa, especially on children.[76] Few researchers use Western instruments to measure mental health outcomes that are validated in non-Western contexts. In addition, there is a lack of evidence on the efficacy of

70 Sanchez-Montero et al., 2010.
71 WHO, 2005.
72 Popkin, 2003, pp. 581–597; Tollman et al., 2008, pp. 893–901.
73 Ki-Moon, 2010.
74 Rosato et al., 2008, pp. 962–971.
75 Save the Children, 2011.
76 McLeod & Shanahan, 1993, pp. 351–366; McLoyd & Wilson, 1991.

interventions developed and rigorously tested, based on Western assumptions about human relationships, communication and coping in Africa.[77]

Maternal mental health

Although largely neglected in maternal and child health work, mental health is a key component of maternal and child welfare. Mothers are particularly vulnerable to depression and other mental health problems, both during pregnancy and following childbirth. Especially in LMICs, maternal mental health can have a substantial impact on low birth weight and stunting in children.[78] Depression is the largest cause of non-fatal disease burden and the fourth leading cause of disease burden globally,[79] and is a disorder with psychological, social and other consequences across family members and generations.[80]

Because maternal mental health is a major determinant of infant and child survival and development,[81] strategies are needed to increase prevention of mental health problems, including programmes designed to reduce violence and abuse. Such programmes should be integrated into existing health and educational programmes.[82] For example, a 'generational' intervention (i.e., a family-based approach) to depression and/or HIV can be particularly effective for these two diseases as it has the potential to improve the context of children born into risky households by engaging with all members of the family. Such an approach is also considered 'developmental' in that it should acknowledge the unique challenges arising at different times in the child's development.[83]

Determinants of child mental health

Children's emotional and cognitive development may be affected by exposure to inadequate nutrition and infection, as well as pressure to prematurely assume adult family roles.[84] Conflicts expose children to prolonged and repeated stressors that can have severe immediate and long-term psychological consequences, including post-traumatic stress, depression and behavioural problems.[85] Despite a slowing down of

77 Verdeli et al., 2008, pp. 605–624.
78 Surkan et al., 2011, pp. 607–615.
79 Lopez et al., 2006.
80 Tomlinson, 2010, pp. 9–17.
81 Vikram et al., 2008, pp. 313–334.
82 Vikram et al., 2008, pp. 313–334.
83 Tomlinson, 2010, pp. 9–17.
84 Lesser & Adams, 2007, pp. 5–10; Srour & Srour, 2006, pp. 289–309.
85 Brajsa-Zganec, 2005, pp. 31–43.

the HIV epidemic on a global level, HIV prevention and care needs for children are increasing. The HIV/AIDS epidemic has drawn new attention to the need to address mental health as a global health concern because significant mental health issues arise among people infected and affected by HIV, including children. Overall, much remains to be understood on the psychological consequences of HIV/AIDS among children, including the specific emotional effects by age, type of orphan and living arrangements.

HIV has had a significant impact on social stability in Africa, with particularly detrimental effects on the poorest individuals and communities. The number of children orphaned by HIV/AIDS is estimated at 25 million globally, and, due to the time lag between HIV infection and death from AIDS, orphan populations will continue to rise even after HIV rates decline.[86] Orphaned and vulnerable children are particularly at risk due to a lack of resources and support, and may be forced to leave school and engage in labour, prostitution or other risky behaviours—thereby increasing their likelihood of contracting HIV.

The widespread impact of HIV also has an intergenerational gap, resulting in children becoming increasingly dependent on elder caretakers who are no longer able to generate income.[87] Affected children experience a wide array of problems, including psychosocial distress and depression, and may be compelled to drop out of school to help with household work; they may also experience declining access to food, shelter, clothing, immunisations and other health services. Orphaned children and children with chronically ill adults in their households are increasingly vulnerable to various forms of distress as a result of stigma and discrimination, and uncertainty about their future, and may be required to act as primary carers for younger siblings and/or chronically ill adults. In addition, witnessing the physical deterioration and pain of an HIV-infected parent may have negative psychological impacts on the child.

Public health research: Mental health and effective models

There are a number of intervention models to address mental health, but few of these, particularly in Africa, have been formally evaluated. Research and intervention studies on counselling, and emotional and social support for children affected by HIV/AIDS are scarce and are focused mostly on the specific difficulties and traumas of orphans. Furthermore, the number of health workers specialising in mental health remains insufficient in most LMICs. Nonetheless, evidence of successful interventions does exist. In southern Uganda,[88] a randomised, controlled clinical trial

86 Salaam, 2005, pp. 1–24.
87 Linsk & Mason, 2004, pp. 127–136.
88 Verdeli et al., 2003, pp. 114–119.

using interpersonal psychotherapy in a group format revealed that after six months of involvement in the intervention arm, participants showed a significantly lower rate of depression and symptoms of functional impairment compared to the control group.[89] There is similar evidence of the effectiveness of this method among war-affected adolescents and orphans and other vulnerable children in reducing mental health and psychosocial problems.[90]

Conclusion

Caregivers globally want their children to stay healthy and have access to quality care. Healthy child development at the family and community levels necessitates quality intervention programmes designed to work together with parents and children to improve health and well-being. A combined approach, including psychological support, development and health, both for the child and household as a whole, is essential.

The combined health-related pressures of HIV/AIDS, malaria, tuberculosis and NCDs, including mental health, are placing even greater pressure on caregivers as many children have lost their biological parents, thus requiring increased support from society as a whole and reinforcing, more than ever, that, indeed, it 'takes a village to raise a child'. While there is now significant knowledge available on improving the living conditions of the poorest members of society, directed, concerted efforts are needed to implement promising intervention methods that promote physical and mental health among children and aim to reduce and avoid illness. Intervention methods designed to be carried out by trained, non-professionals under the most challenging conditions are crucial to improving early child development, and can be directly integrated into existing family-support programmes and services.

Improved programming requires the strengthening of the health system as a whole, rather than focusing on isolated, project-based approaches. Such strengthening depends on widespread governance and leadership, with the involvement of a wide range of actors, including government and civil society, to respond effectively and efficiently to the wider needs of the community—down to the most vulnerable and marginalised individuals. It is critical for governments to increase predictable domestic resources for health systems. Both advocacy and increased awareness are essential in the development of concrete accountability frameworks designed to create long-term, sustainable improvement in quality child development.

89 Bass et al., 2006, pp. 567–573.

90 Bolton et al., 2007, pp. 519–527.

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References

Abegunde, D.O., Mathers, C.D., Adam, T., Ortegon, M. & Strong, K. (2007). The burden and costs of chronic diseases in low-income and middle income countries. *The Lancet*, 370(9603), 1929–1938.

Awases, M., Nyoni, J., Bessaoud, K., Diarra-Nama, A.J. & Ngenda, C.M. (2010). Development of human resources for health in the WHO African region: Current situation and way forward. *The African Health Monitor*, 12, 22–29.

Bagenda, D., Nassali, A., Kalyesubula, I., Sherman, B., Drotar, D., Boivin, M.J. & Olness, K. (2006). Health, neurologic, and cognitive status of HIV-infected, long-surviving, and antiretroviral-naive Ugandan children. *Pediatrics*, 117(3), 729–740.

Bass, J., Neugebauer, R., Clougherty, K., Verdeli, H., Wickramaratine, P., Ndogoni, L., … Bolton, P. (2006). Group interpersonal psychotherapy for depression in rural Uganda: 6-month outcomes. *British Journal of Psychiatry*, 188, 567–573.

Bequele, A. (2005). Universal birth registration: The challenge in Africa. *The African Child Policy Forum*, 1–25.

Bergman, N.J. & Jurisoo, L. (1994). The 'kangaroo-method' for treating low birth weight babies in a developing country. *Tropical Doctor*, 24, 57–60.

Berman, P.A. (1997). National health accounts: Appropriate methods and recent applications. *Health Economics*, 6, 11–30.

Berman, P.A. (1998). Rethinking health care systems: Private health-care provision in India. *World Development*, 26(8), 1463–1479.

Berti, P.R., Mildon, A., Siekmans, K., Main, B. & MacDonald, C. (2010). An adequacy evaluation of a 10-year, four-country nutrition and health programme. *International Journal of Epidemiology*, 39(2), 613–629.

Betancourt, T.S., Rubin-Smith, J.E., Beardslee, W.R., Stulac, S.N., Fayida, I. & Safren, S. (2011). Understanding locally, culturally, and contextually relevant mental health problems among Rwandan children and adolescents affected by HIV/AIDS. *AIDS Care: Psychological and Socio-medical Aspects of AIDS/HIV*, 23(4), 401–412.

Bhutta, Z. A., Chopra, M., Axelson, H., Berman, P., Boerma, T., Bryce, J., … Wardlaw, T. (2010). Countdown to 2015 decade report (2000–2010): Taking stock of maternal, newborn and child survival. *The Lancet*, 375(9730), 2032–2044.

Bjorkman, M. & Svensson, J. (2009). Power to the people: Evidence from a randomized field experiment on community-based monitoring in Uganda. *Quarterly Journal of Economics*, 124(2), 735–769.

Black, R.E., Allen, L.H., Bhutta, Z.A., Caulfield, L.E., De Onis, M., Ezzati, M., … Rivera, J. (2008). Maternal and child undernutrition: Global and regional exposures and health consequences. *The Lancet*, 371(9608), 243–260.

Boivin, M.J., Green, S.D., Davies, A.G., Giordani, B., Mokili, J.K. & Cutting, W.A. (1995). A preliminary evaluation of the cognitive and motor effects of pediatric HIV infection in Zairian children. *Health Psychology*, 14, 13–21.

Bolton, P., Bass, J., Betancourt, T., Speelman, L., Onyango, G., Clougherty, K. F., … Verdeli, H. (2007). Interventions for depression symptoms among adolescent survivors of war and displacement in Northern Uganda. *Journal of the American Medical Association (JAMA)*, 298(5), 519–527.

Bradshaw, C.P., Glaser, B.A., Calhoun, G.B. & Bates, J.M. (2006). Beliefs and practices of the parents of violent and oppositional adolescents: An ecological perspective. *The Journal of Primary Prevention*, 27(3).

Bradshaw, T. (2006). Taking forward work with men in families. In L. Richter & R. Morrell (eds). *Baba: Men and Fatherhood in South Africa*. Cape Town: HSRC Press.

Brajsa-Zganec, A. (2005). The long-term effects of war experiences on children's depression in the republic of Croatia. *Child Abuse & Neglect*, 29(1), 31–43.

Brakarsh, J. (2008). The journey of life: Community workshop to support children. Retrieved from www.repssi.org

Bronfenbrenner, U. (1977). Toward an experimental ecology of human development. *American Psychologist*, 32(7), 513–531.

Bronfenbrenner, U. (1979). Contexts of child rearing: Problems and prospects. *American Psychologist*, 34(10), 844.

Bronfenbrenner, U. (1994). Ecological models of human development. In M. Gauvain & M. Cole (eds). *International Encyclopedia of Education* (2nd edn, Vol. 3). New York: Freeman, pp. 37–43.

Bronfenbrenner, U. & Morris, P.A. (1998). The ecology of development processes. In W. Damon & R.M. Lerner (eds). *Handbook of Child Psychology: Theoretical Models of Human Development* (5th edn, Vol. 1). Hoboken, NJ: John Wiley & Sons, pp. 993–1028.

Brown, K.H., Dewey, A.L. & Allen, L. (1998). *Complementary Feeding: A State-of-the-art Review*. UNICEF/WHO consultation. Geneva: WHO, pp. 1–24.

Brown, L., Thurman, T. & Snider, L. (2005). Strengthening the psychosocial well-being of youth-headed households in Rwanda: Baseline findings from an intervention trial. *Horizons Research Update*, Washington, DC, 1–8.

Bryan, L., Conway, M., Keesmaat, T., McKenna, S. & Richardson, B. (2009). A practical approach to health system strengthening in sub-Saharan Africa. *Health International*, 9, 80–95.

Bryce, J., El Arifeen, S., Pariyo, G., Lanata, C., Gwatkin, D. & Habicht, J.P. (2003). Reducing child mortality: Can public health deliver. *The Lancet*, 362, 159–164.

Charpak, N., Tessier, R., Ruiz, J.G., Hernandez, J.T., Uriza, F., Villegas, J., … Cortes, D. (2016). Twenty-year follow-up of kangaroo mother care versus traditional care. *Pediatrics*, e2016–2063.

Chen, I.C. (2004). *Harnessing the Power of Human Resources for Achieving the MDGs*. Geneva: World Health Organization.

Coovadia, H., Jewkes, R., Barron, P., Sanders, D. & McIntyre, D. (2009). The health and health system of South Africa: Historical roots of current public health challenges. *The Lancet*, 374, 817–834.

Dedomenico, L. (1999). Examining the impact of HIV on infant development: Comparing developmentally delayed children participating in an early intervention program. PhD Dissertation, Fordham University, New York.

Deloitte. (2009). Strengthening health systems with mobile technology: Innovative solutions to improve antenatal care. Retrieved from: http://www.deloitte.com/view/en_US/us/Insights/Browse-by-Content-Type/Case-Studies/US-Federal-Government-Case-Studies/99c1529f7ae60310VgnVCM3000001c56f00aRCRD.htm

Deters, L. & Bajaj, D. (2008). Orphans and vulnerable children in Ghana: A contextual analysis: ECCD stakeholders adapting the safety net. Master's thesis, Columbia University, New York.

Dodd, R. & Cassels, A. (2006). Health, development and the millennium development goals. *Annals of Tropical Medicine and Parasitology*, 100(5–6), 379–387.

Drotar, D., Olness, K., Wiznitzer, M., Guay, L., Marum, L., Svilar, G., … Kiziri-Mayengo, R. (1997). Neurodevelopmental outcomes of Ugandan infants with human immunodeficiency virus type 1 infection. *Pediatrics*, 100(1), 5.

Engle, P.L., Black, M.M., Behrman, J.R., De Mello, M.C., Gertler, P.J., Kapiriri, L., … Young, M.E. (2007). Strategies to avoid the loss of developmental potential in more than 200 million children in the developing world. *The Lancet*, 369, 229–242.

Evans, J. (2006). *Parenting Programmes: An Important ECD Intervention Strategy*. Paper commissioned by the Education for All Global Monitoring Report as background information to assist in drafting the 2007 report. Paris: UNESCO.

Garbarino, J. (1977). The human ecology of child maltreatment: A conceptual model for research. *Journal of Marriage and Family*, 39(4), 721–735.

Germann, S. (2005). An exploratory study on the quality of life and coping strategies of orphans living in child headed households in the high HIV prevalence urban community, Bulawayo, Zimbabwe. PhD dissertation, University of South Africa, Pretoria.

Global Financing Facility (GFF). (2016). *Second Investors' Group Meeting: Report on Private Sector Engagement*. Retrieved from: https://www.globalfinancingfacility.org/sites/gff_new/files/documents/GFF-IG2-8_Private per cent20Sector per cent20Engagement.pdf

Gruen, R.L., Baillie, R.S., Wang, Z., Heard, S. & O'Rourke, I.C. (2006). Specialist outreach to isolated and disadvantaged communities: A population-based study. *The Lancet*, 368(9530), 130–138.

Gruen, R.L., Weeramanthri, T.S., Knight, S.S.E. & Bailie, R.S. (2004). Specialist outreach clinics in primary care and rural hospital settings. *Cochrane Database, Systematic Review*, 1(4), 1–71.

Harmonization for Health in Africa (HHA). (2011). *Investing in Health for Africa: The Case for Strengthening Systems for Better Health Outcomes*. Retrieved from: http://www.who.int/pmnch/media/membernews/2011/investing_health_africa_eng_summary.pdf

Hawkins, J.D., Kosterman, R., Catalano, R.F., Hill, K.G. & Abbott, R.D. (2005). Promoting positive adult functioning through social development intervention in childhood: Long-term effects from the Seattle social development project. *Archives of Pediatrics and Adolescent Medicine*, 159, 25–31.

Hill, Z., Kirkwood, B. & Edmond, K. (2004). *Family and Community Practices that Promote Child Survival, Growth and Development: A Review of the Evidence*. Geneva: WHO.

Human Rights Campaign. (1989). Human Rights Committee, *General Comment No. 18*, *Adopted at the 37th Session of the Human Rights Committee, (HRI/GEN/1/Rev.6)*, 10 November 1989, para. 1.

International Institute for Child Rights and Development (IICRD). (2017). *Child Rights Ecology.* Retrieved from: http://www.iicrd.org/projects/child-rights-ecology

Irwin, L.G., Siddiqi, A. & Hertzman, C. (2007). *Early Child Development: A Powerful Equalizer*. Geneva: World Health Organization, Commission on the Social Determinants of Health.

Jones, D.J., Beach, S.R.H., Forehand, R. & Foster, S.E. (2003). Self-reported health in HIV-positive African American women: The role of family stress and depressive symptoms. *Journal of Behavioral Medicine*, 26(6), 577–599.

Ki-moon, B. (2010). *Global Strategy for Women's and Children's Health*. Retrieved from: http://www.who.int/pmnch/topics/maternal/20100914_gswch_en.pdf

Knight, W.G., Mellins, C.A., Levenson, R.L., Arpadi, S.M. & Kairam, R. (2000). Effects of pediatric HIV infection on mental and psychomotor develoment. *Journal of Paediatrics Psychology*, 25(8), 583–587.

Landgren, K. (2005). The protective environment: Development support for child protection. *Human Rights Quarterly*, 26(1), 214–248.

Lesser, J. & Adams, K. (2007). The effects of war on children: School psychologist's role and function. *School Psychology International*, 28(1), 5–10.

Lewin, S., Lavis, J.N., Oxmann, A.D., Bastias, G., Chopra, M., Ciapponi, A., … Haines, A. (2008). Supporting the delivery of cost-effective interventions in primary health-care systems in low-income and middle-income countries: An overview of systematic reviews. *The Lancet*, 372(9642), 928–939.

Lincetto, O., Nazir, A. & Cattaneo, A. (2000). Kangaroo mother care with limited resources. *Journal of Tropical Pediatrics*, 46, 293–295.

Linsk, N.L. & Mason, S. (2004). Stresses on grandparents and other relatives caring for children affected by HIV and AIDS. *Health and Social Work*, 29(2), 127–136.

Lopez, A., Mathers, C., Ezzati, M., Jamison, D. & Murray, C. (2006). *Global Burden of Disease and Risk Factors*. New York: Oxford University Press.

Lowenthal, E.D., Anabwani, G.M., Jibril, H.B., Barr, B., Rankopo, O.M. & Kline, M.W. (2005). The role of a paediatric centre of excellence in assuring the prioritisation and quality of paediatric care within a developing national HIV care programme. *The Southern African Journal of HIV Medicine* (19), 42–46.

MacDonald, A.C., Main, B.J., Namarika, R.H., Yiannakis, M.E. & Mildon, A.M. (2011). Small-animal revolving funds: An innovative programming model to increase access to and consumption of animal-source foods by rural households in Malawi. In B. Thompson & L.

Amoroso (eds). *Combating Micronutrient Deficiencies: Food-based Approaches*. Compton, CA: CAB eBooks, pp. 137–149.

Marek, T., Diallo, I., Ndiaye, B. & Rakotosalama, J. (1999). Successful contracting of prevention services: Fighting malnutrition in Senegal and Madagascar. *Health Policy and Planning*, 14(4), 382–389.

McGrath, N., Bellinger, D., Robins, J., Msamanga, G.I., Tronick, E. & Fawzi, W.W. (2006). Effect of maternal multivitamin supplementation on the mental and psychomotor development of children who are born to HIV-1–infected mothers in Tanzania. *Pediatrics*, 117(2), 216–225.

McLeod, J.D. & Shanahan, M.J. (1993). Poverty, parenting, and children's mental health. *American Sociological Review*, 58(3), 351–366.

McLeroy, K.R., Bibeau, D., Steckler, A. & Glanz, K. (1988). An ecological perspective on health promotion programs. *Health Education and Behavior*, 15(4), 351–377.

McLoyd, V.C. & Wilson, L. (1991). The strain of living poor: Parenting, social support, and child mental health. In A.C. Huston (ed.). *Children in Poverty: Child Development and Public Policy*. Cambridge: Cambridge University Press.

Meintjes, I., Field, S., Sanders, L., Van Heyningen, T. & Honikman, S. (2010). Improving child outcomes through maternal mental health interventions. *Journal of Child and Adolescent Mental Health*, 22(2), 73–82.

Mellins, C.A. & Ehrhardt, A.A. (1994). Families affected by pediatric acquired immunodeficiency syndrome: Sources of stress and coping. *Journal of Behavioral Pediatrics*, 15(3), 54–60.

Miles, M.S., Gillespie, J.V. & Holditch-Davis, D. (2001). Physical and mental health in African-American mothers with HIV. *Journal of the Association of Nurses in AIDS Care*, 12(4), 42–50.

Ministry of Health. (2004). *Ethiopia National Strategy for IYCF*. Addis Ababa: The Federal Ministry of Health of Ethiopia, Family Planning Department.

Ministry of Health. (2008). *National Nutrition Strategy*. Addis Ababa: The Ministry of Health, Federal Democratic Republic of Ethiopia.

Moneyham, L., Sowell, R., Seals, B. & Demi, A. (2000). Depressive symptoms among African-American women with HIV disease. *Research and Theory for Nursing Practice*, 14(1), 9–39.

Morrison, M.F., Petitto, J.M., Ten Have, T., Gettes, D.R., Chiappini, M.S., Weber, A.L., … Evans, D.L. (2002). Depressive and anxiety disorders in women with HIV infection. *The American Journal of Psychiatry*, 159, 789–796.

Msellati, P., Lepage, P., Hitimana, D.G., Van Goethem, C., Van de Perre, P. & Dabis, F. (1993). Neurodevelopmental testing of children born to human immunodeficiency virus type 1 seropositive and seronegative mothers: A prospective cohort study in Kigali, Rwanda. *Pediatrics*, 92(6), 843–848.

Nicholson, S. & Clarke, A. (2005). *Child Friendly Healthcare: A Manual for Health Workers*. Nottingham: Child Friendly Healthcare Initiatives.

Office of the High Commissioner for Human Rights (OHCHR). (2007). *Legislative History of the Convention on the Rights of the Child* (Vol. 2). New York: OHCHR.

Olley, B.O., Seedat, S., Nei, D.G. & Stein, D.J. (2004). Predictors of major depression in recently diagnosed patients with HIV/AIDS in South Africa. *AIDS Patient Care and STDs*, 18(8), 481–487.

Partnership for Maternal, Newborn and Child Health. (2009a). *Consensus for Maternal, Newborn and Child Health*. Geneva: PMNCH/WHO. Retrieved from: http://www.who.int/pmnch/knowledge/publications/2009_mnchconsensus/en/

Partnership for Maternal, Newborn and Child Health. (2009b). *Investing in Maternal, Newborn and Child Health: The Case for Asia and the Pacific*. Geneva: PMNCH/WHO, Investing in Health. Retrieved from: https://www.adb.org/sites/default/files/publication/29141/investing-maternal-child-health.pdf

Patel, V., Fisher, A.J., Hetrick, S. & McGorry, P. (2007). Mental health of young people: A global public-health challenge. *The Lancet*, 369, 1302–1313.

Pope, D.P., Mishra, V., Thompson, L., Siddiqui, A.R., Rehfuess, E.A., Weber, M. & Bruce, N. (2010). Risk of low birth weight and stillbirth associated with indoor air pollution from solid fuel use in developing countries. *Epidemiological Review*, 32(1), 70–81.

Popkin, B.M. (2003). The nutrition transition in the developing world. *Development Policy Review*, 21(5), 581–597.

Regional Psychsocial Support Initiative (REPSSI). (2004). *Journey of Life: Community Facilitation Manual*. Johannesburg: REPSSI.

Reynolds, A.J. & Temple, J.A. (1998). Extended early childhood intervention and school achievement: Age thirteen findings from the Chicago longitudinal study. *Child Development*, 69(1), 231–246.

Richter, L.M. (2003). Poverty, underdevelopment and infant mental health. *Journal of Paediatrics and Child Health*, 39, 243–248.

Richter, L.M. & Morrell, R. (eds). (2006). *Baba: Men and Fatherhood in South Africa*. Cape Town: HSRC Press.

Richter, L.M. & Morrell, R. (2008). Fathering: The role of men in raising children in Africa —holding up the other half of the sky. In M. Garcia, A. Pence & J. Evans (eds). *Africa's Future, Africa's Challenge: Early Childhood Care and Development in Sub-Saharan Africa*. Washington, DC: World Bank.

Rosato, M., Laverack, G., Grabman, L.H., Tripathy, P., Nair, N., Mwansambo, C., … Costello, A. (2008). Community participation: Lessons for maternal, newborn, and child health. *The Lancet*, 372, 962–971.

Ruiz-Pelaez, J.G., Charpak, N. & Cuervo, L.G. (2004). Kangaroo mother care: An example to follow from developing countries. *British Medical Journal*, 329(1179), 1182–1183.

Saifuddin, A., Creanga, A., Gillespie, D. & Tsui, A. (2007). The mental health of children orphaned by AIDS: A review of international and Southern African research. *Journal of Child and Adolescent Mental Health*, 19(1), 1–17.

Salaam, T. (2005). *AIDS Orphans and Vulnerable Children (OVC): Problems, Responses, and Issues for Congress*. Washington, DC: Congressional Research Service, Library of Congress, pp. 1–24.

Sanchez-Montero, M., Ubach, N.S. & Sullivan, M. (2010). *Undernutrition: What Works? A Review of Policy and Practice*. New York: LACF International Network and Tripode.

Save the Children (2011). *State of the World's Mothers*. Retrieved from: http://www.who.int/pmnch/media/news/2011/20110503_stc_state_world_mothers/en/

Schneir, A., Kipke, M., Melchior, L. & Huba, G. (1998). Children's Hospital Los Angeles: A model of integrated care for HIV-positive and very high-risk youth. *Journal of Adolescent Health*, 23(25), 59–71.

Schweinhart, L.J., Barnes, H.V. & Weikart, D.P. (1993). *Significant Benefits: The High/Scope Perry Preschool Study Through Age 27* (Vol. 10). Ypsilanti, MI: High/Scope Press.

Shier, L.A., Harris, S.K. & Beardslee, W.R. (2002). Temporal associations between depressive symptoms and self-reported sexually transmitted diseases among adolescents. *Archives of Pediatrics and Adolescent Medicine*, 156, 599–606.

Shonkoff, J.P. & Phillips, D. (2000). *From Neurons to Neighborhoods: The Science of Child Development*. Washington, DC: National Academies Press.

Silver, E.J., Bauman, L.J., Camacho, S. & Hudis, J. (2003). Factors associated with psychological distress in urban mothers with late-stage HIV/AIDS. *AIDS and Behavior*, 7(4), 421–431.

Small, M.L. (2006). Neighborhood institutions as resource brokers: Childcare centers, interorganizational ties, and resource access among the poor. *Social Problems*, 53(2), 274–292.

Srour, R.W. & Srour, A. (2006). Communal and familial war-related stress factors: The case of the Palestinian child. *Journal of Loss and Trauma*, 11, 289–309.

Surkan, P.J., Kennedy, C.E., Hurley, K.M. & Black, M.M. (2011). Maternal depression and early childhood growth in developing countries: Systematic review and meta-analysis. *Bulletin of the World Health Organization*, 286, 607–615.

Tenner, A., Feudo, R. & Woods, E.R. (1998). Shared experiences: Three programs serving HIV-positive youths. *Child Welfare*, 77(2), 222–250.

Thurman, T.R. (2007). *Assessing the Psychosocial Benefits of Community-based Mentoring Program for Youth-headed Households in Rwanda.* New Orleans, LA: Tulane University.

Tollman, S.M., Kahn, K., Sartorius, B., Collinson, M.A., Clark, S.J. & Garenne, M.L. (2008). Implications of mortality transition for primary health care in rural South Africa: A population-based surveillance study. *The Lancet*, 372(9642), 893–901.

Tomlinson, M. (2010). Family-centred HIV interventions: Lessons from the field of parental depression. *Journal of the International AIDS Society*, 13(2), 9–17.

Touch Foundation. (2012). Retrieved from: http://www.touchfoundation.org/

Travis, P., Bennett, S., Haines, A., Pang, T., Bhutta, Z., Hyder, A.A., … Evans, T. (2004). Overcoming health-systems constraints to achieve the Millennium Development Goals. *The Lancet*, 364, 900–906.

United Nations Children's Fund (UNICEF). (2005). *The 'Rights' Start to Life: A Statistical Analysis of Birth Registration*. New York: UNICEF. Retrieved from: https://www.unicef.org/publications/index_25248.html

United Nations Children's Fund (UNICEF). (2006a). Programming experiences in early child development. *For Every Child, Health, Education, Equality, Protection*, 1st edn, November. New York: UNICEF. Retrieved from: https://www.unicef.org/earlychildhood/files/programming per cent20experiences per cent20in per cent20early per cent20childhood.pdf

United Nations Children's Fund (UNICEF). (2006b). *Africa's Orphaned and Vulnerable Generations: Children Affected by AIDS*. New York: UNICEF. Retrieved from: https://www.unicef.org/publications/files/Africas_Orphaned_and_Vulnerable_Generations_Children_Affected_by_AIDS.pdf

United Nations Children's Fund (UNICEF). (2008). Strategic analysis in civil registration in the context of HIV and AIDS. *President's Emergency Plan for AIDS Relief (PEPFAR), Plan International*. New York: UNICEF.

United Nations Children's Fund (UNICEF). (2011). *Programming Guide: Infant and Young Child Feeding*. New York: UNICEF. Retrieved from: https://www.unicef.org/Birth_registration_in_the_context_of_HIV_and_AIDS.pdf

United Nations (UN). (2016). *Sustainable Development Goals*. New York: UN. Retrieved from: http://www.un.org/sustainabledevelopment/sustainable-development-goals/

United Nations High Commissioner for Refugees (UNHCR). (2008). *Guidelines on Determining the Best Interests of the Child*. Article 14. Geneva: UNHCR. Retrieved from: http://www.unhcr.org/4566b16b2.pdf

United States Agency for International Development (USAID). (2008). Orphans and vulnerable children in high HIV-prevalence countries in sub-Saharan Africa. *DHS Analytical Studies*, 15.

United States Agency for International Development (USAID). (2009). *The Status of Family Planning in sub-Saharan Africa*. USAID Briefing Note.

Van Rie, A., Mupuala, A. & Dow, A. (2008). Impact of the HIV/AIDS epidemic on the neurodevelopment of preschool-aged children in Kinshasa, Democratic Republic of the Congo. *Pediatrics*, 122(1), 123–128. New York: UNICEF.

Verdeli, H., Clougherty, K., Bolton, P.S., Peelman, L., Ndogoni, L., Bass, J., … Weissman, M. (2003). Adapting group interpersonal psychotherapy for a developing country: Experience in rural Uganda. *World Psychiatry*, 2(2), 114–119.

Verdeli, H., Clougherty, K., Onyango, G., Lewandowski, E., Speelman, L., Betancourt, … Bolton, P. (2008). Group interpersonal psychotherapy for depressed youth in IDP camps in northern Uganda: Adaptation and training. *Child and Adolescent Psychiatric Clinics of North America*, 17(3), 605–624.

Victoria, C.G., Hanson, K., Bryce, J. & Vaughan, J.P. (2004). Achieving universal coverage with health interventions. *The Lancet*, 364, 1541–1548.

Vikram, P., Flisher, A., Nikapota, A., & Malhotra, S. (2008). Promoting child and adolescent mental health in low and middle income countries. *Journal of Child Psychology and Psychiatry*, 49(2), 313–334.

Wakabi, W. (2010). Africa faces uphill struggle to reach the MDGs. *The Lancet*, 376, 943–944.

Wakabi, W. (2011). South Sudan faces grim health and humanitarian situation. *The Lancet*, 377(9784), 2167–2168.

Walker, S.P., Wachs, T.D., Gardner, J.M., Lozoff, B., Wasserman, G.A., Pollitt, E. & Carter, J.A. (2007). Child development: Risk factors for adverse outcomes in developing countries. *The Lancet*, 369, 145–157.

Ward, L.M. & Eyber, C. (2009). Resiliency of children in child-headed households in Rwanda: Implications for community based psychosocial interventions. *Intervention*, 7(1), 17–33.

Whitworth, J., Sewankambo, N.K. & Snewin, V.A. (2010). Improving implementation: Building research capacity in maternal, neonatal, and child health in Africa. *PLoS Medicine*, 7(7).

World Bank. (2004). *World Development Report: Making Services Work for Poor People*. Washington, DC: World Bank. Retrieved from: https://openknowledge.worldbank.org/bitstream/handle/10986/5986/WDR per cent202004 per cent20- per cent20English.pdf?sequence=1

World Health Organisation (WHO). (1999). *A Critical Link: Interventions for Physical Growth and Psychological Development*. Department of Child and Adolescent Health and Development. Geneva: WHO. Retrieved from: http://www.who.int/maternal_child_adolescent/documents/chs_cah_99_3/en/

World Health Organisation (WHO). (2003). *Kangaroo Mother Care: A Practical Guide*. Geneva: WHO. Retrieved from: http://www.who.int/maternal_child_adolescent/documents/9241590351/en/

World Health Organisation (WHO). (2005). *Preventing Chronic Disease: A Vital Investment*. Geneva: WHO. Retrieved from: http://www.who.int/chp/chronic_disease_report/en/

World Health Organisation (WHO). (2007). *Task Shifting: Rational Redistribution of Tasks Among Health Workforce Teams*. Geneva: WHO. Retrieved from: http://www.who.int/healthsystems/TTR-TaskShifting.pdf

World Health Organisation (WHO). (2008a). *Closing the Gap in a Generation: Health Equity Through Action on the Social Determinants of Health*. Final Report of the Commission on Social Determinants of Health. Geneva: WHO. Retrieved from: http://apps.who.int/iris/bitstream/10665/43943/1/9789241563703_eng.pdf

World Health Organisation (WHO). (2008b). *Maternal Mental Health and Child Health and Development in Low and Middle Income Countries*. Report of the WHO-UNFPA meeting held in Geneva, Switzerland (30 January–1 February). Retrieved from: http://www.who.int/mental_health/prevention/suicide/mmh_jan08_meeting_report.pdf

World Health Organisation (WHO). (2011a). *The Abuja Declaration: Ten Years On*. Geneva: WHO. Retrieved from: http://www.who.int/healthsystems/publications/abuja_report_aug_2011.pdf

World Health Organisation (WHO). (2011b). Advancing the health of children and adolescents through the practical application of the Convention on the Rights of the Child (unpublished). Geneva: WHO.

World Health Organisation (WHO). (2012). *Maternal, Newborn, Child and Adolescent Health*. Geneva: WHO. Retrieved from: http://www.who.int/maternal_child_adolescent/en/

World Health Organisation (WHO). (2015). *Mental Health Atlas 2014*. Geneva: WHO. Retrieved from: http://apps.who.int/iris/bitstream/10665/178879/1/9789241565011_eng.pdf

Chapter 5

Maternal depression and child development in sub-Saharan Africa

Charlotte Hanlon

Introduction

In the 2007 *Lancet* series on child development in low- and middle-income countries (LMICs), three of the nine risk factors identified as priorities for intervention were psychosocial in nature: inadequate cognitive stimulation, maternal depression and exposure to violence (in the form of war, community or political-sectarian violence).[1] In addition, further research on the role of mother–child interactions, specifically caregiver sensitivity, responsivity and positive affect, was recommended. Based on evidence from high-income countries, we would expect these psychosocial risk factors to be interrelated,[2] but in sub-Saharan Africa and other LMIC settings, additional complexity arises through their interaction with biological risk factors for poor child development. In this chapter, we propose a conceptual model for the relationship between maternal depression and child development in sub-Saharan Africa and provide an overview of the existing evidence, highlighting gaps in understanding. This is followed by a critical examination of the findings from our ongoing panel study of maternal depression and child development in rural Ethiopia, focusing on some of the methodological challenges and potential fruitful areas for future research. Further detail on the links between attachment and child development are examined in greater detail in this volume.

Clarification of terms

In this chapter, maternal 'depression' mostly describes the dimensional measurement of depressive symptoms, either alone or in combination with anxiety and/or somatic symptoms. The latter is often referred to as 'common mental disorder' (CMD) symptoms.[3] The reason to include broader symptoms of CMD under the rubric of

1 Walker et al., 2007, pp. 145–157.
2 Murray et al., 1996, pp. 2512–2526.
3 Goldberg & Goodyer, 2005.

'depression' is the compelling evidence that depressive, anxiety and somatisation disorders rarely exist as distinct diagnostic categories in community samples and primary health-care settings.[4] Instead, CMD symptoms show substantial overlap and, even when present at 'sub-threshold' levels for a diagnosis of mental disorder, are associated with negative consequences, for example, in terms of functioning.[5] This approach is not without its critics[6] and will be discussed later in relation to methodological issues. Very few studies discussed here measured diagnoses of depression made according to standardised diagnostic criteria; where present, this is highlighted.

It is recognised that the term 'sub-Saharan Africa' incorporates countries of diverse cultures, histories, geographies and politics. Even within individual countries, high levels of diversity are encountered: in Ethiopia alone, there are over 80 ethnic groups.[7] The justification for considering evidence from sub-Saharan Africa as a defining category in this chapter is that this region is composed predominantly of low-income countries, which face similar health challenges and share some sociocultural features. The dearth of evidence from the African continent also necessitates consideration of the limited evidence from other LMIC settings to help to define testable research questions applicable to sub-Saharan Africa.

A conceptual model

There is a wealth of evidence from high-income countries supporting a strong link between maternal depression and child cognitive and socio-emotional development,[8] which appears to be mediated by suboptimal patterns of communication between mother and infant.[9] More recently, evidence has started to accrue that also supports the importance of exposure to antenatal depression as a risk factor for poorer child development.[10] However, the generalisability of such evidence to LMIC settings cannot be assumed. An important reason for this is that some of the major risk

4 Hanlon et al., 2008, pp. 251–262; Lewis, 1992, pp. 1011–1018.
5 Berardi et al., 1999, pp. 133–148.
6 Pawlby et al., 2008, pp. 241–245.
7 Central Statistical Authority (CSA), 2008.
8 Beck, 1999, pp. 623–629; Grace et al., 2001, pp. 27–34; Murray & Cooper, 1997, pp. 253–260.
9 Murray et al., 1996, pp. 2512–2526.
10 O'Connor et al., 2002, pp. 1470–1477; O'Connor et al., 2003, pp. 1025–1036.

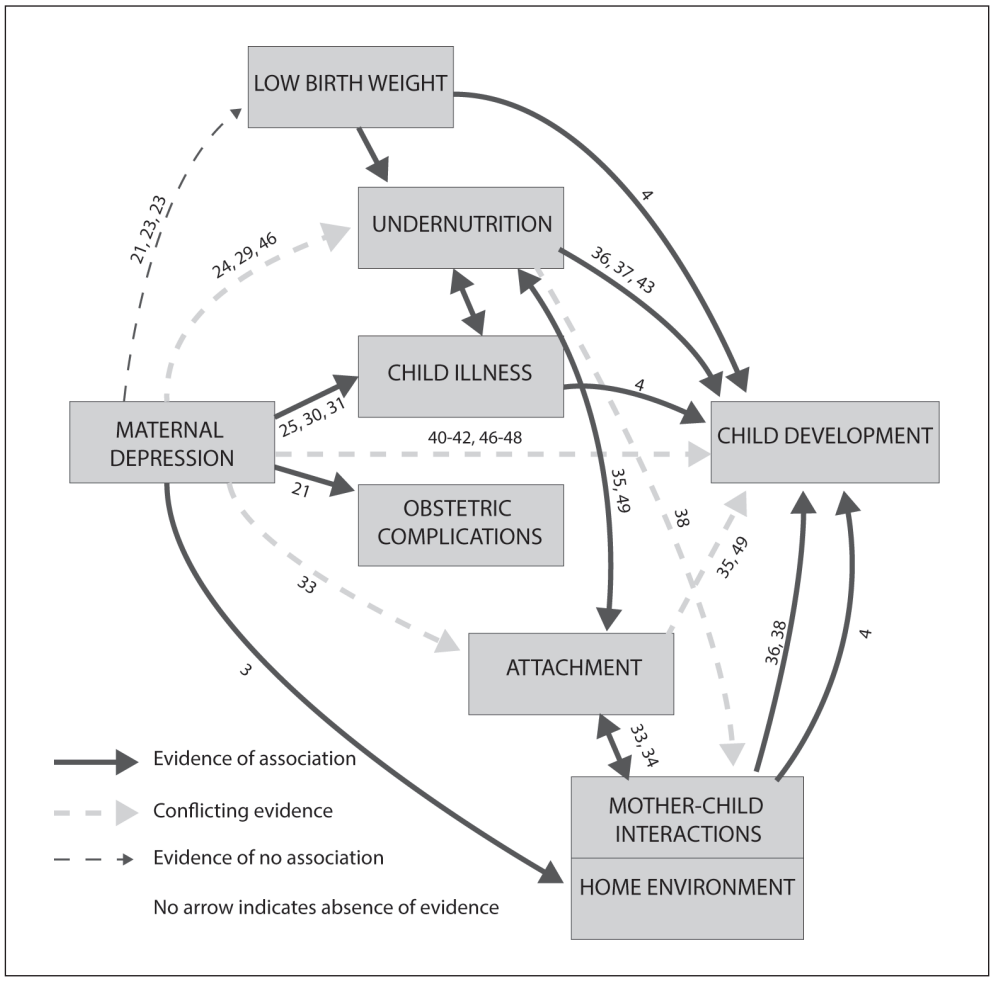

Figure 5.1: Conceptual model of the relationship between maternal depression and child development in sub-Saharan Africa, based on evidence[11]

Source: Hanlon et al., 2009, pp. 156–166

11 Aboud & Alemu, 1995, pp. 725–732; Adewuya et al., 2008, pp. 191–193; Avan et al., 2010, pp. 690–695; Bennett et al., 2016, pp. 168–173; Bhargava, 2000, pp. 89–104; Brittain et al., 2015, pp. 505–514; Cooper et al., 2009, p. 974; Cooper et al., 1999, 554–558; Drewett et al., 2001, pp. 181–187; Hadley et al., 2008, pp. 259–275; Hanlon et al., 2009, pp. 156–166; Hanlon et al., 2011; Harpham et al., 2005; Kermoian & Leiderman, 1986, pp. 455–469; Medhin et al., 2010, p. 32; Murray et al., 2016, pp. 270–276; Ndokera & MacArthur, 2011, pp. 74–81; Okronipa et al., 2012, pp. 2216–2225; Peterson et al., 2001, pp. 3–17; Rosset al., 2010; Sabet et al., 2009, pp. 944–954; Servili et al., 2010, p. 693; Sigman et al., 1988, pp. 1251–1261; Stewart et al., 2008, pp. 209–219; Tomlinson et al., 2005, pp. 1044–1054; Tomlinson et al., 2006, pp. 81–86; True et al., 2001, pp.1451–1466; Wado et al., 2014.

factors for poorer child development in the LMICs, such as child undernutrition, are rarely encountered in high-income country settings. Emerging evidence from the LMICs is allowing us to start to make links between psychosocial exposures and such salient biological risk factors for poorer child development.[12] However, little is known about the mediating pathways (both biological and psychosocial) linking maternal depression and child development in the LMICs.

A proposed conceptual model for pathways from maternal depression to child development is presented in Figure 5.1, with the existing supporting evidence from sub-Saharan Africa indicated. The search strategy used is detailed in Box 5.1. A total of 25 reports are included, nine from Ethiopia (five studies), six from South Africa (four studies), four from Kenya, and one each from Ghana, Malawi, Mali, Nigeria, Uganda and Zambia.

Box 5.1: Search strategies for conceptual model & literature review

Ovid MEDLINE (1946 to December 2016) was searched using the following search strategies:

Search strategy for maternal depression and child development in sub-Saharan Africa

1. (Postnatal depression.mp. OR exp Depression, Postpartum) OR (mental health.mp OR exp Mental Health OR mental disorder.mp OR exp Mental Disorders OR exp Depression OR depression.mp) AND (exp Mothers OR exp Pregnancy OR exp Postpartum Period) AND (exp 'Africa South of the Sahara' OR sub-Saharan Africa.mp)

2. (exp Child Development OR exp Child Behavioural Disorders exp OR Language Development OR exp Child Behaviour) AND (exp 'Africa South of the Sahara' OR sub-Saharan Africa.mp)

Search strategy for studies on attachment disorder in sub-Saharan Africa

(Exp Attachment) AND (exp 'Africa South of the Sahara' OR sub-Saharan Africa.mp)

Search strategies for maternal depression and child development in other low- and middle-income countries

As above, but (exp 'Developing Countries') instead of (exp 'Africa South of the Sahara' OR sub-Saharan Africa.mp).

The search strategies were augmented by hand-searching of references from relevant articles, including a 2012 systematic review.[13]

Source: Compiled by the author

12 Patel et al., 2003, pp. 34–37; Rahman et al., 2004, pp. 946–952.

13 Parsons et al., 2012, pp. 57–79.

Evidence from sub-Saharan Africa

The existing evidence base contributing to the proposed conceptual model will now be reviewed, focusing on studies conducted in sub-Saharan Africa, but referring to studies from other LMIC settings where the African evidence is lacking or there appears to be interesting differences across settings. Findings from the Ethiopia C-MaMiE study will be integrated into this review. For context, a brief overview of the C-MaMiE study methodology is given in Box 5.2.

Box 5.2: Child health, growth and development in relation to maternal mental health in Ethiopia: The C-MaMiE study

The C-MaMiE study is an ongoing population-based panel study based in Butajira, a predominantly rural area of Ethiopia, located around 130 km south of the capital, Addis Ababa. Between July 2006 and February 2007, 1 065 women (85% of eligible) who were in the third trimester of pregnancy, living in the Butajira Health and Demographic Surveillance (HDS) site, able to converse in Amharic and give informed consent, were recruited into the project. At 3.5 years post-partum, 94.5% (n=869) of surviving singleton, mother–child dyads were still under follow-up.

Maternal depression (assessed in pregnancy and at 2, 12, 30, 36 and 42 months post-partum) was measured using the 20-item version of the Self-Reporting Questionnaire (Beusenberg & Orley, 1994) following cultural validation in perinatal women in the Butajira area (Hanlon et al., 2008).

Child development (at 12, 30 and 42 months) was assessed using the Bayley Scales of Infant Development, version 3 (Bayley, 2006), adapted for the Butajira setting.

Home stimulation (at 30 and 42 months) was assessed using observational items from the responsivity sub-scale of the Infant-Toddler HOME Inventory (Caldwell & Bradley, 1979).

Source: Hanlon et al., 2009, 156–166

Maternal depression and child development

A recent systematic review found the weighted mean prevalence of 'probable' maternal depression in Africa to be 11.3 per cent in pregnancy (based on five studies) and 18.3 per cent in the postnatal period (based on 21 studies).[14]

There have been four studies from sub-Saharan Africa investigating the association between maternal depression and child cognitive, language and/or motor development. Three of the studies were carried out in predominantly rural areas of Ethiopia, characterised by high levels of child undernutrition, illness and poverty,[15]

14 Sawyer et al., 2010, pp. 17–29.

15 Hadley et al., 2008, pp. 259–275; Servili et al., 2010, p. 693.

and one was conducted in a peri-urban settlement in South Africa.[16] Two of the Ethiopian studies made use of existing health and democratic surveillance (HDS) sites to ensure representative population-based samples[17] and the third Ethiopian study aimed to be nationally representative.[18] A further community-based cohort from South Africa looked at maternal depression and child behavioural development.[19] The study characteristics are summarised in Table 5.1.

In the cross-sectional study by Hadley and colleagues,[20] the overall child developmental score (combining the domains of personal/social, motor and language development) was associated inversely with maternal depression. Paternal depression was not associated with child development, in contrast to findings from high-income settings.[21] Post-hoc analyses indicated that only maternal depressive symptoms, but not anxiety symptoms, appeared to be related to poorer child development, although this was noted to be speculative and needing replication. When developmental domains were considered separately, maternal depression was associated with all except language. This study was limited by the lack of validated and standardised measures, as well as by its cross-sectional design: maternal depression could have been secondary to poorer child development and not vice versa (reverse causality) and depressed mothers could have reported more negative child development because of their negative mood and not the child's actual performance (negative cognitive bias/ recall bias).

In contrast, in our Ethiopia C-MaMiE study, no prospective association was found between maternal depression and cognitive, language or motor development of children at 12 months of age[22] or at 2.5 and 3.5 years of age.[23] For the 12-month assessment of child development, maternal depression was measured in pregnancy and postnatally. Similarly, in the large, prospective Young Lives study in Ethiopia, maternal depression at one year was not associated with child-receptive language development at either five or eight years of age.[24] Strengths of this study included the extensive validation work undertaken for the development measure, the Peabody Picture Vocabulary Test (PPVT).

In South Africa, a secondary analysis of the impact of antenatal depression on child cognitive outcomes was carried out using data from a trial to evaluate the

16 Murray et al., 2016, pp. 270–276.
17 Hadley et al., 2008, pp. 259–275; Servili et al., 2010, p. 693.
18 Bennett et al., 2016, pp. 168–173.
19 Avan et al., 2010, pp. 690–695.
20 Hadley et al., 2008, pp. 259–275.
21 Ramchandani et al., 2005, pp. 2201–2205.
22 Servili et al., 2010, p. 693.
23 Hanlon et al., 2011.
24 Bennett et al., 2016, pp. 168–173.

Table 5.1a: Maternal depression and child development in sub-Saharan Africa

Study	Country	Location	Setting	Study design	Sample size	Validated depression measure	Validated development measur	Development measure used	Age of children	Adjusted for confounders	Maternal depression associate
Low-income countries											
Hadley et al.	Ethiopia	Rural	Community	Cross sectional	437	No	No	Items from Denver II (Frankenburg et al., 1992)	3–24 months	Yes	Yes. Beta coefficient 0.03 ($p<0.01$)
Servili et al., 2010; Hanlon et al., 2011	Ethiopia	Mostly rural	Community	Cohort	194	Yes	Yes. (Hanlon et al., 2016)	Bayley III (Bayley, 2006)	12 months	Yes	No
					395	Yes	Yes. (Hanlon et al., 2016)	Bayley III (Bayley, 2006)	2.5 and 3.5 years	Yes	No
Bennett et al., 2016	Ethiopia	Rural	Community	Cohort	1 885	Yes	Yes. (Hanlon et al., 2016)	Peabody Picture Vocabulary Test (PPVT) (Dunn & Dunn, 2007)	5 and 8 years	Yes	No
Upper middle-income countries											
Avan et al., 2010	South Africa	Urban	Community	Cohort	1 035	No	No	Richman Child Behaviour Scale (Richman & Graham, 1971)	2 years	Yes	yes
L. Murray et al, 2016	South Africa	Peri-urban informal settlement	Community	Trial (analysed as cohort)	263 (out of 449 enrolled	Semi-structured clinician diagnosis	No	Bayley II (N. 1993)	18 mon ths	Yes	No

Source: Compiled by the authors

Table 5.1b: Maternal depression and child development in the LMICs, excluding sub-Saharan Africa

Study	Country	Location	Setting	Study design	Sample size	Validated depression measure	Validated development measure	Development measure used	Age of children	Adjusted for confounders	Maternal depression associated
Low-income countries											
Black et al.	Bangladesh	Rural	Community	Exposure measured after outcome	221	No	No	Bayley II (Bayley, 1993)	6–12 months	Yes	Only in presence of irritable infant
Hamadani et al., 2012	Bangladesh	Rural	Community	Cohort	448	Yes	Yes. (Hanlon et al., 2016)	Bayley II (Bayley, 1993)	6–12 months	Yes	No
Nasreen et al., 2013	Bangladesh	Rural	Community	Cohort	652	Yes	No	Maternal report of developmental milestones	6–8 months	Yes	No
Lower middle-income countries											
Patel et al., 2003	India	Urban	Hospital based	Nested cohort	43 exposed,46 non-expose	Yes	Yes	Developmental Assessment Scale for Indian Infants (Phatak, 1998)	6 months	Only birth weight and maternal education	Yes
Bennett et al, 2016	India	Rural	Community	Cohort	1 930	Semi-structured clinician diagnosis	No	Bayley II (N. 1993)	5 and 8 years	Yes	At age 8. Adjusted risk ratio 1.25 (95% CI 1.01, 1.49)
Bennett et al, 2016	Peru	Rural	Community	Cohort	1 946	Yes	Yes	PPVT	5 and 8 years	Yes	No
Bennett et al, 2016	Vietnam	Rural	Community	Cohort	1 961	Yes	Yes	PPVT	5 and 8 years	Yes	At age 5. Adjusted risk ratio 1.23 (95% CI 1.01, 1.49)

Note: Table is continued on the following page

Table 5.1b: (continued)

Study	Country	Location	Setting	Study design	Sample size	Validated depression measure	Validated development measure	Development measure used	Age of children	Adjusted for confounders	Maternal depression associated
Lower middle-income countries (cont.)											
Tran, Biggs et al., 2014; Tran et al., 2013; Tran, Tran et al., 2014	Vietnam	Rural	Community	Cohort	378	Yes	No	Bayley III (Bayley, 2006)	6–8 months	Yes. Conducted path analysis	(See note below)
Maselko et al., 2015	Pakistan	Rural	Community	Trial and comparative cohort	N=584 women in trial (n=289 intervention/ n=295 enhanced care control) who had antenatal depression; n=300 control group of non-depressed pregnant women	Clinician diagnosis of major depressive disorder according to DSM-IV	No	Wechsler Preschool and Primary Scale of Intelligence (cognitive). Strengths and Difficulties Questionnaire and Spence Children's Anxiety Scale (socio-emotional)	& years	Yes	No effect of intervention on child development. Association between antenatal depression and poorer social-emotional development
Upper middle-income countries											
Galler et al., 2000	Barbados	Urban	Hospital-based, but 99% coverage	Cohort	92	Yes	No	Griffiths Mental Development Scale (Griffiths, 1954)	3 and 6 months	Yes	Yes, at 6 months
Galler et al, 2004	Barbados	Urban	Community	Cohort	165	No	No		11–12 years	Yes	Yes

Note: Antenatal depression indirectly associated with socio-emotional development via parenting efficacy and postnatal depression. Antenatal depression, not postnatal depression, associated with cognitive and motor development

Source: Compiled by the authors

impact of a home-visiting intervention targeting the mother–infant relationship.[25] In the trial sample, antenatal depression was associated with poorer child cognitive development, even after adjusting for postnatal depression. A strength of the study was the use of mental health specialists to obtain a clinical diagnosis of depression using a semi-structured, standardised interview. However, the follow-up rate was 58.6 per cent and the finding may have been affected by selective attrition.

The impact of maternal depression on child social and emotional development has been investigated in a large, birth cohort study from South Africa, the 'Birth to Twenty' cohort.[26] In this study, maternal postnatal depression, measured six months after birth, was associated with child behavioural problems at two years of age, after adjusting for a range of potential confounding variables. The study was limited by a high level of loss to follow-up, raising the possibility of attrition bias, and the use of depression and development measures that had not been culturally validated within this setting. Furthermore, reliance on maternal reports of child behavioural problems may have given rise to negative recall bias. Replication of the findings is required and generalisability may be limited because of the unusually high level of exposure to political violence and social upheaval during the study period; however, the study has a number of strengths, not least of which are the prospective design and adjustment for most pertinent confounders. We are unaware of any other African studies examining the association between maternal depression and child social and emotional development.

Maternal depression and child development in LMICs outside of sub-Saharan Africa

Findings from LMICs outside of sub-Saharan Africa, which have examined the association between maternal depression and child development, have been similarly mixed. Another HDS site-based study in Bangladesh found no association between maternal depression at 12 months and child development at either six or 12 months.[27] Maternal depression at 12 months was associated with poorer acquisition of developmental skills between six and 12 months, but only if the mother also reported that the infant had an irritable temperament. As the measure of infant temperament relied on contemporaneous maternal self-report, the reliability of this association is questionable. A subsequent cohort study in the same HDS site in Bangladesh with superior methodology (prospective measurement, culturally validated measure of depression and larger sample size; n=488) found no association

25 Murray et al., 2016, pp. 270–276.
26 Avan et al., 2010, pp. 690–695.
27 Black et al., 2007, pp. 764–772.

between postnatal depression and any of the measures of child development after adjusting for child nutritional status and socio-economic status.[28] In a larger (n=652) population-based cohort study from Bangladesh, using maternal self-reports of achievement of motor developmental milestones by six to eight months of age, postnatal depression was associated with poorer development.[29] Negative recall bias may have contributed to this association.

In a smaller, hospital-based study from Goa, India, maternal postnatal depression was prospectively associated with poorer mental development in children, but not motor development at six months of age.[30] A strength of this study was the use of culturally validated measures of both maternal depression and child development; however, there was no adjustment for the important potential confounder of socio-economic status. In Pakistan, an intervention which was effective at reducing postnatal depression by 12 months was not associated with improved child cognitive outcomes by age seven years. Furthermore, when the children of the antenatally depressed women included in both arms of the trial were compared to non-depressed women, who were screened out of the trial, there was evidence of poorer social-emotional development at seven years.[31] This was particularly in relation to anxiety symptoms. The study used standardised clinician diagnoses of maternal depression.

In the Young Lives study sites in India, Peru and Vietnam, conflicting findings between the sites were obtained.[32] In India, exposure to maternal depression at one year of age was associated with poorer receptive language development at eight years of age. In Vietnam, maternal depression was associated only with poorer language development at five years of age. In Peru, there was no association at either five or eight years of age. In a rigorous population-based cohort study from Vietnam, women were assessed twice during pregnancy and twice in the postnatal period (two to three months and six to eight months) using biological measures (iron-deficiency anaemia and anthropometric measures), a validated measure of depression and a range of psychosocial exposures.[33] Path analysis was used to elucidate possible direct and indirect pathways linking perinatal depression with child development outcomes. Iron deficiency and anaemia and antenatal depression, but not postnatal depression, were associated independently with poorer cognitive and motor development. Antenatal depression was associated with worse socio-emotional development through an indirect pathway via lower parenting self-efficacy, poorer parenting practices and postnatal depression.

28 Hamadani et al., 2012, pp. 193–204.
29 Nasreen et al., 2013, pp. 254–261.
30 Patel et al., 2003, pp. 34–37.
31 Maselko et al., 2015, pp. 609–617.
32 Bennett et al., 2016, pp. 168–173.
33 Tran, Biggs et al., 2014, pp. 104–112; Tran et al., 2013; Tran, Tran et al., 2014, p. 8.

In Barbados, maternal postnatal depression was associated prospectively with poorer motor, personal/social, hearing, speech and eye–hand coordination performance domains of infant development at three months but not at six months of age.[34] Enduring effects of postnatal depression were apparent however. At subsequent follow-up, maternal postnatal symptoms of despair were associated with worse performance in the offspring in the Barbados national school examination at 11 and 12 years of age.[35]

Summary: Evidence for maternal depression affecting child development

In summary, there have been few studies from sub-Saharan Africa and other LMICs investigating the association between maternal depression and child development. Community-based, prospective studies from Ethiopia, Bangladesh and Peru found no association, although associations were seen in India and Vietnam.[36] In keeping with the accumulating evidence from high-income countries,[37] antenatal depression has been shown to be associated with child development outcomes in some studies, sometimes independently of the continuity between ante- and postnatal depression. Possible methodological reasons for the differing findings will be considered later in the context of the Ethiopia C-MaMiE study findings.

Potential mediators of the effect of maternal depression on child development

Foetal and child growth

The association between child undernutrition and poorer cognitive, motor and socio-emotional development is well-established[38] and supported by a number of studies from varying settings in sub-Saharan Africa.[39] Poorer intra-uterine growth reflected in low birth weight is also an established risk factor for poorer child cognitive development,[40] but perhaps not so important for socio-emotional development.[41] In

34 Galler et al., 2000, pp. 747–757.
35 Galler et al., 2004, pp. 1064–1075.
36 Bennett et al., 2016, pp. 168–173.
37 O'Connor et al., 2002, pp. 1470–1477.
38 Grantham-McGregor & Baker-Henningham, 2005, pp. 1191–1201.
39 Aboud & Alemu, 1995, pp. 725–732; Avan et al., 2010, 690–695; Drewett et al., 2001, pp. 181–187; Hanlon et al., 2011; Servili et al., 2010, p. 693; Sigman et al., 1988, pp. 125–126.
40 Grantham-McGregor et al., 1998, pp. 661–666.
41 Sabet et al., 2009, pp. 944–954.

the last few years, there have also been a number of studies looking at the association between maternal depression and both birth weight and child undernutrition, thus potentially identifying mechanisms by which maternal depression might act on child development. These studies will now be reviewed.

In sub-Saharan Africa, studies exploring the association between maternal depression and child undernutrition have given rise to mixed findings. Clinic-based, cross-sectional studies from Nigeria and Malawi found a positive association, although the former did not adjust for potential confounders,[42] and the latter was only significant when considering length-for-age but not weight-for-age.[43] Two community-based urban cohorts from South Africa, both with relatively high levels of exposure to community-level violence, had differing results.[44] The smaller cohort used clinician-based measures of maternal depression but may have been under-powered to detect an effect and found no association with child growth at 18 months.[45] The larger cohort study used a self-report depression scale that had not been culturally validated and found an association with child stunting at two years of age.[46] In Ethiopia, two large community-based, prospective studies both failed to find an association between maternal depression and child growth.[47] The first reported study was larger (n=1 885), but used a non-validated cut-off for their depression scale.[48] In the C-MaMiE study,[49] the sample was smaller (n=926), but the cut-off for the depression scale had been culturally validated in the population prior to the study.[50] These mixed findings are in contrast to studies from southern Asia which have more consistently found an association between maternal depression and child growth.[51] A 2011 meta-analysis of 11 studies from LMICs concluded that there was overall evidence of an association between maternal depression and child growth:[52] odds ratio (OR) of 1.5; 95 per cent CI 1.2, 1.8 for underweight (low weight-for-age) and OR 1.4; 95 per cent CI 1.2, 1.7 for stunting (low length/height-for-age). However, the pooling of data across geographical regions could have obscured important regional differences.

Antenatal maternal depression has been found to be associated with low birth weight, an important risk factor for poorer child growth and development, in three

42 Adewuya et al., 2008, pp. 191–193.
43 Stewart et al., 2008, pp. 209–219.
44 Avan et al., 2010, pp. 690–695; Tomlinson et al., 2006, pp. 81–86.
45 Tomlinson et al., 2006, pp. 81–86.
46 Avan et al., 2010, pp. 690–695.
47 Bennett et al., 2016, pp. 168–173; Harpham et al., 2005; Medhin et al., 2010, p. 32.
48 Bennett et al., 2016, pp. 168–173; Harpham et al., 2005.
49 Medhin et al., 2010, p. 32.
50 Hanlon et al., 2008, pp. 653–659.
51 Anoop et al., 2004, pp. 325–329; Black et al., 2009, pp. 951–957; Patel et al., 2003, pp. 34–37; Rahman et al., 2004, pp. 946–952.
52 Surkan et al., 2011, pp. 607–615.

studies from southern Asia.[53] However, in two studies from Ethiopia, there were conflicting findings. In the Ethiopia C-MaMiE study, no association was seen,[54] but in a smaller community-based study using a non-validated measure of postnatal depression, maternal depression in the second and third trimesters of pregnancy was associated with low birth weight.[55] In a clinic-based study from South Africa, antenatal depression was associated with head circumference at birth but not with weight for gestational age.[56] Pre-pregnancy depression was associated with low birth weight in a population-based sample from South Africa.[57]

Two published studies from sub-Saharan Africa set out to determine whether maternal depression and child development could be mediated by the effect of maternal depression upon child growth.[58] In the South Africa study, the association found between maternal depression and child behavioural problems became non-significant after including child stunting in the final multivariable analysis.[59] In the Ethiopia C-MaMiE study, there was no association between maternal depression and child cognitive, motor and language development and so a possible mediating role of child undernutrition could not be evaluated.[60] Of note, there was also no association between maternal depression and child undernutrition in the Ethiopian study, which supports the notion that, if maternal depression has an effect on child development, it may be mediated primarily through its effect on child undernutrition.

That said, neither study made use of the appropriate statistical modelling techniques, such as path analysis[61] and structural equation modelling,[62] to properly evaluate the direct and indirect effects of maternal depression on child development. As has been hypothesised previously, any effect of maternal depression on child growth may be mediated by factors such as mother–child interaction,[63] which in turn is known to be associated with child development in high-income countries.[64] In this regard, it is interesting that a well-conducted randomised controlled trial of cognitive behavioural therapy for postnatal depression in a rural Pakistan community failed to have any impact on child growth, even though maternal depression was successfully

53 Nasreen et al., 2010, p. 515; Niemi et al., 2013, pp. 687–695; Patel et al., 2006, pp. 284–285; Rahman et al., 2007, pp. 24–28.
54 Hanlon et al., 2009, pp. 156–166.
55 Wado et al., 2014.
56 Brittain et al., 2015, pp. 505–514.
57 Tomita et al., 2015, pp. 2179–2186.
58 Avan et al., 2010, pp. 690–695; Servili et al., 2010, p. 693.
59 Avan et al., 2010, pp. 690–695.
60 Servili et al., 2010, p. 693.
61 Streiner 2005, pp. 115–122.
62 Klein, 1998.
63 Patel et al., 2004, pp. 820–823; Rahman, et al., 2002, pp. 51–56.
64 Murray et al., 1996, pp. 2512–2526.

treated.[65] More proximal and enduring consequences of maternal depression, such as mother–infant interaction and attachment, may be of greater consequence for child growth and development in sub-Saharan Africa.

Child ill-health

Maternal depression has been found to be associated with infant diarrhoeal episodes in a cross-sectional, clinic-based study from Nigeria,[66] a prospective facility-based study in Ghana,[67] and the prospective, community-based C-MaMiE study from Ethiopia.[68] These findings are in keeping with methodologically rigorous studies from southern Asia[69] and are postulated to arise due to impairment of the mother's functioning, for example, her ability to maintain a hygienic environment and adhere to health-education messages. However, evidence linking infant diarrhoeal episodes to child development has been mixed.[70] In the Ethiopia C-MaMiE study, illness episodes of non-specified type were independently associated with poorer child development after excluding children who were ill on the day of testing (to exclude performance bias).[71] Child HIV infection has been reliably shown to be associated with neurodevelopmental delays in cognitive, motor and language domains,[72] even after adjustment for the level of environmental stimulation,[73] but no studies have examined the potential role of maternal depression in this relationship. The prevalence of depression is estimated to be increased two-fold in persons living with HIV/AIDS,[74] although the few studies of perinatal women in sub-Saharan Africa have shown mixed findings.[75]

Mother–child interactions

The mother–child interactions of greatest relevance to child development are thought to be those of maternal sensitivity and responsivity.[76] Several studies from sub-Saharan Africa have examined mother–child interactions in relation to the child's level of development. In a study from rural Kenya, increased maternal verbal interaction with the child and higher levels of responsiveness to child vocalisations

65 Rahman et al., 2008, pp. 902–909.
66 Adewuya et al., 2008, pp. 191–193.
67 Okronipa et al., 2012, pp. 2216–2225.
68 Ross et al., 2010.
69 Rahman et al., 2007, pp. 24–28.
70 Walker et al., 2007, pp. 145–157.
71 Hanlon et al., 2011.
72 Abubakar et al., 2008, pp. 880–887.
73 Drotar et al., 1997, p. 5.
74 Ciesla & Roberts, 2001, pp. 725–730.
75 Bernatsky et al., 2007, pp. 674–676.
76 Murray & Cooper, 1997, pp. 253–260.

were associated with superior mental development measures using the Bayley Scales.[77] A study from the same area of Kenya also showed that behavioural development was better in infants whose mothers spent a greater proportion of their time talking to them.[78]. Similarly, in a rural area of Ethiopia, the verbal responsiveness of the mother to her child was associated with better child development as measured by the Bayley Scales.[79] Of note, in this Ethiopian study there was no association between maternal responsivity and child undernutrition.

One of the most important factors affecting mother–child interactions in high-income countries is the mental health of the mother.[80] The salience of maternal mental health to mother–child interactions in a sub-Saharan African setting has been investigated in a series of studies from a peri-urban settlement of Khayelitsha, near Cape Town, South Africa. In a community sample of 147 postnatal women, standardised and reliable ratings of maternal sensitivity (including responsivity) and infant positive engagement were significantly lower in the infants of women with postnatal depression at cross-sectional assessment.[81] In multivariable analyses, only indicators of social support (presence of a partner in the home and regular practical support from the partner) were associated with the mother–infant interaction; in particular, there was no association with socio-economic status. When the cohort was followed up until the children were 18 months old, postnatal depression was associated with lower maternal sensitivity and increased maternal intrusiveness.[82] Some disaggregation of the effects of maternal depression on mother–child interactions was indicated by a subsequent, randomised, controlled trial of a health-worker intervention that led to an improvement in mother–child interactions without significantly decreasing the levels of maternal depression.[83]

To date, in sub-Saharan Africa, this literature review has not identified any studies that have investigated the relationship between maternal depression, mother–infant interactions and child development within the same study.

Attachment

Infant attachment describes a series of behaviours elicited from the infant on separation from, and reunion with, the main caregiver. Secure attachment enables an infant to more confidently explore their environment, a prerequisite for learning and development, whereas insecure attachment has been associated with poorer

77 Sigman et al., 1988, pp. 1251–1261.
78 Bhargava, 2000, pp. 89–104.
79 Aboud & Alemu, 1995, pp. 725–732.
80 Murray & Cooper, 1997, pp. 253–260.
81 Cooper et al., 1999, pp. 554–558.
82 Tomlinson et al., 2005, pp. 1044–1054.
83 Cooper et al., 2009, p. 974.

child development and subsequent adult relationships in high-income countries.[84] Associations between attachment and child development, and between maternal depression and insecure attachment, have been found in sub-Saharan African studies, although no investigators have looked at all three components in the same study. Some interesting cultural differences emerge, which may go some way to explain apparent variations in the association between maternal depression and child development across cultural settings.

In the Gusii of Kenya, infant attachment to the mother was compared to attachment to the person considered by the mother to make the next biggest contribution to the care of the child.[85] In half of the cases, the alternative caregiver was an older sibling aged six years or younger. Secure attachment to the mother was seen in 61 per cent of infants, and to the alternative caregiver in 54 per cent. However, while secure attachment to the mother was associated with better nutritional status in the infant, only secure attachment to the alternative caregiver was associated with the infant's score on the Bayley Mental Developmental Index.[86] Due to a division of labour in childcare, mothers predominantly tended to physical care and protection, and alternative caregivers were more involved in play and social interaction. Although the sample size was small (n=26 mother–infant dyads) and the findings require replication, this study indicates a mechanism whereby children may be protected from the adverse effects of maternal depression on attachment.

In the Dogon of Mali, the relationship between mother–infant interactions and attachment was explored in 27 infant–mother dyads in a rural village.[87] Insecure attachment was associated positively with maternal communication violations and frightened/frightening behaviours and inversely associated with maternal sensitivity. These suboptimal mother–infant interaction styles were also found to be associated with maternal depression in the studies from Khayelitsha, South Africa,[88] as well as with insecure attachment.[89] Postnatal depression was also associated with later insecure attachment; however, when examined in a multivariable model, postnatal depression at two months was no longer associated with insecure attachment after adjusting for maternal sensitivity at 18 months.[90] One explanation may be that the association between postnatal depression and attachment was mediated through abnormal mother–infant interactions. The previously described intervention study

84 DeWolff & Van Ijzendoorn, 1997, pp. 571–591.
85 Kermoian & Leiderman, 1986, pp. 455–469.
86 Bayley, 1993.
87 True et al., 2001, pp. 1451–1466.
88 Cooper et al., 1999, pp. 554–558; Tomlinson et al., 2005, pp. 1044–1054.
89 Tomlinson et al., 2005, pp. 1044–1054.
90 Tomlinson et al., 2005, pp. 1044–1054.

to improve mother–infant interactions[91] was associated with a higher level of secure attachment, even though there was no impact on maternal depression, again more supportive of the notion that mother–infant interactions might exert their effects on attachment and development, independently of maternal depression.

Child undernutrition has also been shown to be associated with insecure attachment in an LMIC setting,[92] although this has not been explored in sub-Saharan Africa, offering another route whereby maternal depression can lead to impaired child development.

Cognitive stimulation

Cognitive stimulation results from the child's interaction with the environment, and reflects a combination of availability of objects (for example, books and toys) and experiences (for example, travel outside the home) through which the child can learn about the world, and facilitation of interaction with the environment through the activities of caregivers. It can be seen, therefore, that there is some overlap between cognitive stimulation and certain aspects of mother–child interactions, especially maternal responsivity. Several researchers from sub-Saharan Africa have commented on cultural variability in the level of stimulation provided to children within the home,[93] although this issue has not been investigated systematically across cultures. The early emergence of social behaviour on the Bayley Scales in a Ugandan study was attributed to the high level of expectation that children would interact with adults.[94] Similarly, systematic observations of the home environment in a rural Kenyan setting found high levels of interaction with the child.[95] However, in a rural Ethiopian setting, the level of interaction between adults and children was noted to be low: although adults other than the mother entered 87 per cent of homes during the period of systematic observation, only 44 per cent of children were addressed by these adults.[96] Although relatively infrequent, the verbal responsiveness of the mother was associated with mental development on the Bayley Scales. The authors posit that child-rearing in this Ethiopian setting is 'based on traditional values in which children learn by watching their parents and not by being playful, independent and inquisitive'.[97] As already noted in relation to attachment in rural Kenyan children, in a different rural Kenyan setting, a similar division of caregiving behaviours was

91 Cooper et al., 2009, p. 974.
92 Valenzuela, 1990, pp. 1984–1996.
93 Aboud & Alemu, 1995, pp. 725–732; Kilbride & Kilbride, 1974, pp. 296–314; Sigman et al., 1988, pp. 1251–1261.
94 Kilbride & Kilbride, 1974, pp. 296–314.
95 Sigman et al., 1988, pp. 1251–1261.
96 Aboud & Alemu, 1995, pp. 725–732.
97 Aboud & Alemu, 1995, pp. 725–732.

observed, with mothers tending to be involved in physical care, carrying and talking to their children, older siblings were more involved in touch and other children involved in social interaction.[98] Talking to the child, verbal responsivity and social interaction were all associated with the child's Bayley score for mental development.

Environmental stimulation, conceptualised in terms of encouraging play and mother–infant interaction, was found to improve developmental outcomes in a randomised controlled trial involving undernourished children in Jamaica, independently of nutritional supplementation.[99] This raises the possibility that poorer maternal mental health leads to both child undernutrition and impoverished environmental stimulation, thus leading to poorer child development. As far as we were able to identify, in sub-Saharan Africa only the Ethiopia C-MaMiE study has sought to look at the relationship between maternal depression and the home environment and child undernutrition, as well as the association between home environment and child development.[100] In our study, the responsivity sub-scale of the HOME scale,[101] which includes observations of the mother's interactions with the child, and child stunting were strongly and independently associated with the child's cognitive, motor and language development.[102] In crude analyses (n=397), maternal depression symptoms were associated with a poorer home environment at borderline statistical significance (beta coefficient –0.05; 95 per cent CI –0.11, 0.0004. p=0.052), but there was no association between maternal depression and child undernutrition.[103]

Obstetric complications

In the Ethiopia C-MaMiE study, antenatal maternal depression was associated with prolonged labour.[104] Prolonged labour is assumed to be a proxy for risk of birth asphyxia, which is associated with developmental deficits and delay. Obstetric complications were also found to be a risk factor for postnatal depression in the Ethiopian study,[105] lending further complexity to the potential impact of antenatal depression upon child development.

98 Sigman et al., 1988, pp. 1251–1261.
99 Grantham-McGregor et al., 1991, p. 1; Walker et al., 2005, pp. 1804–1807.
100 Hanlon et al., 2011.
101 Caldwell & Bradley, 1979.
102 Hanlon et al., 2011.
103 Medhin et al., 2010, p. 32.
104 Hanlon et al., 2009, pp. 156–166.
105 Hanlon et al., 2009, pp. 156–166.

The Ethiopia C-MaMiE study

The Ethiopia C-MaMiE study has certain strengths that lend credence to our findings. Our cohort recruited over 86 per cent of eligible pregnant women within the Butajira demographic surveillance site, which has been shown to be representative of the population.[106] The cohort is of a reasonable size (n=1065 at recruitment) and we have maintained high levels of follow-up (around 95 per cent) among surviving mother–child dyads.[107] By recruiting women in pregnancy, the cohort has information on important antenatal exposures. Furthermore, in an area where fewer than one in 10 women give birth in a health facility, we were able to obtain birth weight within 48 hours of birth in a representative subsample of women from five rural districts.[108] We used a measure of maternal depression that was culturally validated in a neighbouring population prior to commencing the study.[109] We have repeated measures of psychosocial risk factors, maternal and child ill-health, and anthropometric measures throughout early childhood. Child development was measured using a standardised instrument,[110] which was carefully adapted to the setting and shown to be reliably administered.[111] Despite the complexity of the assessment, the Bayley Scales were administered to over 400 children at both 2.5 and 3.5 years of age, all of whom also had available birth weights. The findings from the C-MaMiE study are summarised in Figure 5.2, in relation to our proposed conceptual model. Each arrow represents an individual multivariable regression analysis; no analyses of pathways have yet been carried out.

If true, four possible explanations for the lack of association between maternal depression and child development in the C-MaMiE study are:

1. methodological differences
2. the study setting
3. the lack of assessment of socio-emotional developmental outcomes and
4. the role of proxy caregivers.

Each will now be considered in turn. As noted previously, there have been few studies from LMICs to investigate the association between maternal depression and child development. Cross-sectional evaluation of the relationship[112] may have led to measurement bias and uncertainty over the direction of causality, and clinic-

106 Hanlon et al., 2009, pp. 156–166.
107 Hanlon et al., 2011.
108 Hanlon et al., 2009, pp. 156–166.
109 Hanlon et al., 2008, pp. 653–659.
110 Bayley, 2006.
111 Hanlon et al., 2011.
112 Black et al., 2007; Hadley et al., 2008, pp. 259–275.

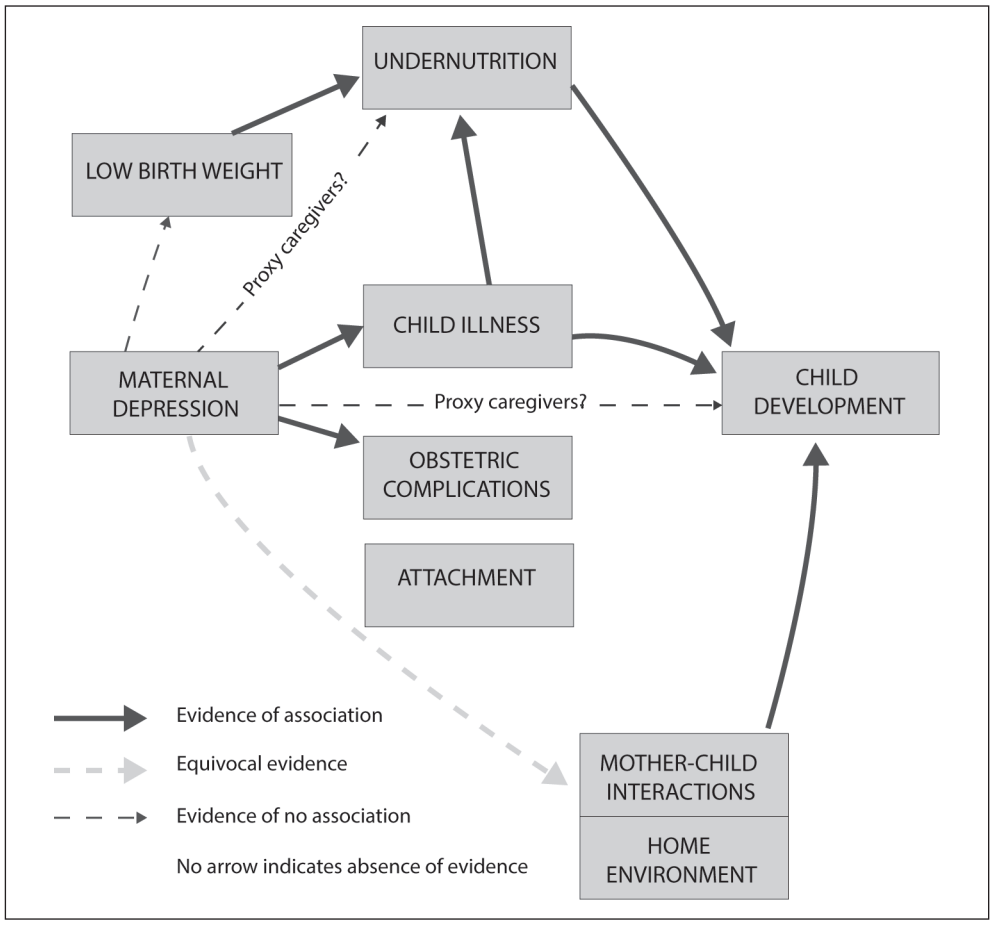

Figure 5.2: Maternal depression and child development: The findings from C-MaMiE

Source: Compiled by the author

based studies may have introduced selection bias.[113] Lack of adequate adjustment for potential confounding variables may also be a factor.[114] Differences in study settings could contribute to differing findings: findings from middle-income countries[115] may not be generalisable to low-income countries, and urban settings with high levels of

113 Patel et al., 2003, pp. 34–37.
114 Patel et al., 2003, pp. 34–37.
115 Avan et al., 2010, pp. 690–695; Galler et al., 2000; Galler et al., 2004, pp. 1064–1075; Grantham-McGregor et al., 1991, p. 1; Walker et al., 2005, pp. 1804–1807.

education[116] may not be comparable to rural settings with high levels of illiteracy.[117] In low-income countries like Ethiopia, India and Bangladesh, as opposed to middle-income countries like Barbados, the methodologically superior, community-based cohort studies[118] indicated no association between maternal depression and child cognitive, language and motor development.

It is possible that more robust associations will be seen between maternal depression and child socio-emotional studies rather than cognitive development; indeed, cross-sectional studies from Ethiopia have already demonstrated associations between maternal depression and child emotional and behavioural disorders.[119] Lastly, as has been suggested by several studies, the caregiving role of the mother in several rural African settings appears to be more concerned with protection, safety and nutrition, rather than play and social interaction.[120] Maternal depression may have less impact on child development where proxy caregivers are readily available to provide secure attachment figures, environmental stimulation and responsive interactions. Challenging this last explanation is the lack of an association between maternal depression and child undernutrition in the C-MaMiE study, a child outcome that might be predicted to be more vulnerable to maternal depression in the rural Ethiopian setting. We know that recognition of depression is low in our study area[121] and so it is unlikely that other adults consciously compensate for the mother's impaired functioning. Although breastfeeding usually continues for two to three years for the majority of mothers, the quality of supplemental feeding might be expected to be poorer if the mother is depressed. If it is true that the effect of maternal depression is mediated fully by its effect on child undernutrition,[122] this may explain the absence of an association between maternal depression and child development in our study.

Some limitations of the C-MaMiE study must also be taken into account. Although our measure of depression was culturally validated for the population under study, our dimensional scale did not give a clinical diagnosis of depression according to international, standardised criteria. It has been argued that a clinical diagnosis of depression is more closely associated with poorer child development,[123] although

116 Avan et al., 2010, pp. 690–695.
117 Hanlon et al., 2011.
118 Black et al., 2007; Servili et al., 2010, p. 693.
119 Mulatu, 1995, pp. 100–109; Tadesse et al., 1999, pp. 92–97.
120 Aboud & Alemu, 1995, pp. 725–732; Abubakar et al., 2008, pp. 880–887; Kermoian & Leiderman, 1986, pp. 455–469; Sigman et al., 1988, pp. 1251–1261.
121 Alem et al., 1999, pp. 40–47.
122 Avan et al., 2010, pp. 690–695.
123 Pawlby et al., 2008, pp. 241–245.

many studies have also seen associations with dimensional measures of depression,[124] and the former would not have been feasible in our setting. The two LMIC studies that have used clinician diagnoses of depression both found no association with child development.[125] A more likely difficulty may have arisen due to the low level of depressive symptoms within our study cohort, relative to other studies.[126] Thus, despite our sample size, we may have been underpowered to detect a true effect. However, even in crude analyses, the estimates did not indicate an association. The use of a measure of child development that had not been culturally validated for a rural Ethiopian setting, might have limited our ability to detect an effect. Although some items of the Bayley Scales were clearly inappropriate to the setting, the scale functioned well as a hierarchical scale, demonstrated variability across our sample, and demonstrated convergent validity with expected associations with poverty and child undernutrition.[127]

One clear limitation of the analyses we have carried out to date is the lack of consideration of mechanisms of action; we have yet to evaluate both the direct effects of maternal depression on child development and the indirect effects operating through mediators such as obstetric complications, undernutrition and environmental stimulation.

Overall summary and recommendations

In summary, there is a scarcity of methodologically rigorous studies investigating the impact of maternal mental health on child development in sub-Saharan Africa and other LMICs, despite the wealth of evidence for detrimental and enduring effects of maternal depression in high-income settings.[128] In the studies that have been conducted, findings do not unequivocally support a negative effect of maternal depression on child development.[129] However, there is some evidence to support effects of maternal depression on known risk factors for poorer child development, including less responsive and sensitive mother–child interactions,[130] an impoverished cognitive environment, less secure child attachment,[131] child undernutrition[132]

124 Avan et al., 2010, pp. 690–695; Hadley et al., 2008, pp. 259–275; Patel et al., 2003, pp. 34–37.
125 Maselko et al., 2015, pp. 609–617; Murray et al., 2016, pp. 270–276.
126 Hanlon et al., 2010, pp. 468–475.
127 Hanlon et al., 2010, pp. 699–708.
128 Hay et al., 2001, pp. 871–889; Murray & Cooper, 1997, pp. 253–260.
129 Avan et al., 2010, pp. 690–695; Hadley et al., 2008, pp. 259–275; Hanlon et al., 2011; Servili et al., 2010, p. 693.
130 Cooper et al., 1999, pp. 554–558; Tomlinson et al., 2005, pp. 1044–1054.
131 Tomlinson et al., 2005, pp. 1044–1054.
132 Adewuya et al., 2008, pp. 191–193; Avan et al., 2010, pp. 690–695; Stewart et al., 2008, pp. 209–219.

and ill-health,[133] and obstetric complications.[134] There have also been interesting observations about the relevance of sociocultural factors; for example, the observed division of caregiving responsibilities between the mother and other caregivers in several rural sub-Saharan African settings, which could buffer children from the detrimental effects of a depressed mother.[135] It is possible that in very poor LMIC settings, the critical effects of poverty, undernutrition and infant ill-health account for most of the variability in child development, leaving little room to observe effects of maternal depression.[136] Our initially proposed conceptual model, based on existing evidence, provides a framework for further evaluation of the impact of maternal depression on child development in different sub-Saharan African settings; however, the model needs to also include exploration of sociocultural factors, such as caregiving factors, where evidence is currently lacking. Recommendations for future research, therefore, include the following:

- More theoretically driven studies looking at pathways and mechanisms rather than individual risk factors for child development. This will include employing sophisticated statistical modelling techniques such as path analysis and structural equation modelling.[137]
- Consideration of the effect of exposure to maternal depression during critical periods, including pregnancy and the postnatal period, and the effects of chronic or recurrent depression.[138]
- Focus on child socio-emotional development as well as the domains of cognitive, motor and language development.
- Systematic investigation of the impact of caregiving behaviours and socio-culturally relevant resilience factors protecting children from the effects of maternal depression.
- Replication studies to examine the impact of maternal depression on obstetric complications and low birth weight in different sub-Saharan African settings.

To achieve many of the above recommendations, large-scale, prospective studies with adequate periods of follow-up are required. Information generated from such studies can then inform the rational development of interventions that are targeted at those factors which most clearly impact child development.

133 Hanlon et al., 2009, pp. 156–166.
134 Hanlon et al., 2009, pp. 156–166.
135 Aboud & Alemu, 1995, pp. 725–732; Sigman et al., 1988, pp. 1251–1261; True et al., 2001, pp. 1451–1466.
136 Hanlon et al., 2011; Medhin et al., 2010, p. 32.
137 Abubakar et al., 2008, pp. 880–887; Tran et al., 2013; Tran, Tran et al., 2014, p. 8.
138 Servili et al., 2010, p. 693.

References

Aboud, F.E. & Alemu, T. (1995). Nutrition, maternal responsiveness and mental development of Ethiopian children. *Social Science & Medicine*, 41(5), 725–732.

Abubakar, A., Van Baar, A., Van de Vijver, F.J., Holding, P. & Newton, C.R. (2008). Paediatric HIV and neurodevelopment in sub-Saharan Africa: A systematic review. *Tropical Medicine & International Health*, 13(7), 880–887.

Abubakar, A., Van de Vijver, F., Van Baar, A., Mbonani, L., Kalu, R., Newton, C. & Holding, P. (2008). Socioeconomic status, anthropometric status, and psychomotor development of Kenyan children from resource-limited settings: A path-analytic study. *Early Human Development*, 84, 613–621.

Adewuya, A.O., Ola, B.O., Aloba, O.O., Mapayi, B.M. & Okeniyi, J.A. (2008). Impact of postnatal depression on infants' growth in Nigeria. *Journal of Affective Disorders*, 108(1–2), 191–193.

Alem, A., Jacobsson, L., Araya, M., Kebede, D. & Kullgren, G. (1999). How are mental disorders seen and where is help sought in a rural Ethiopian community? A key informant study in Butajira, Ethiopia. *Acta Psychiatrica Scandinavica, Supplementum*, 397, 40–47.

Anoop, S., Saravanan, B., Joseph, A., Cherian, A. & Jacob, K.S. (2004). Maternal depression and low maternal intelligence as risk factors for malnutrition in children: A community based case-control study from South India. *Arch Dis Child*, 89(4), 325–329.

Avan, B., Richter, L.M., Ramchandani, P.G., Norris, S.A. & Stein, A. (2010). Maternal postnatal depression and children's growth and behaviour during the early years of life: Exploring the interaction between physical and mental health. *Archives of Disease in Childhood*, 95(9), 690–695.

Bayley, N. (1993). *Bayley Scales of Infant Development, II*. San Antonio, TX: The Psychological Corporation, Harcourt Brace & Co.

Bayley, N. (2006). *Bayley Scales of Infant Development Manual, III*. San Antonio, TX: Psychcorp., Harcourt Assessment.

Beck, C.T. (1999). Maternal depression and child behaviour problems: A meta-analysis. *Journal of Advances in Nursing*, 26, 623–629.

Bennett, I.M., Schott, W., Krutikova, S. & Behrman, J.R. (2016). Maternal mental health, and child growth and development, in four low-income and middle-income countries. *Journal of Epidemiology and Community Health*, 70(2), 168–173.

Berardi, D., Berti Ceroni, G., Leggieri, G., Rucci, P., Ustun, B. & Ferrari, G. (1999). Mental, physical and functional status in primary care attenders. *International Journal of Psychiatry in Medicine*, 29(2), 133–148.

Bernatsky, S., Souza, R. & De Jong, K. (2007). Mental health in HIV-positive pregnant women: Results from Angola. *AIDS Care*, 19(5), 674–676.

Beusenberg, M. & Orley, J. (1994). *A User's Guide to the Self-Reporting Questionnaire (SRQ)*. Geneva: World Health Organization.

Bhargava, A. (2000). Modeling the effects of maternal nutritional status and socioeconomic variables on the anthropometric and psychological indicators of Kenyan infants from age 0–6 months. *American Journal of Physical Anthropology*, 111(1), 89–104.

Black, M.M., Baqui, A.H., Zaman, K., El Arifeen, S. & Black, R.E. (2009). Maternal depressive symptoms and infant growth in rural Bangladesh. *American Journal of Clinical Nutrition*, 89, 951–957.

Black, M.M., Baqui, A.H., Zaman, K., McNary, S.W., Le, K., Arifeen, S.E., … Black, R.E. (2007). Depressive symptoms among rural Bangladeshi mothers: Implications for infant development. *Journal of Child Psychology and Psychiatry and Allied Disciplines*, 48(8), 764–772.

Brittain, K., Myer, L., Koen, N., Koopowitz, S., Donald, K., Barnett, W., … Stein, D.J. (2015). Risk factors for antenatal depression and associations with infant birth outcomes: Results from a South African birth cohort study. *Paediatric and Perinatal Epidemiology*, 29(6), 505–514.

Caldwell, B. & Bradley, R. (1979). *Home Observation for Measurement of the Environment*. Little Rock, AR: University of Arkansas at Little Rock.

Central Statistical Agency (CSA). (2008). *Summary and Statistical Report of the 2007 Population and Housing Census. Population Size by Age and Sex.* Addis Ababa, Ethiopia: Central Statistical Agency. Retrieved from: https://www.scribd.com/doc/28289334/Summary-and-Statistical-Report-of-the-2007

Ciesla, J.A. & Roberts, J.E. (2001). Meta-analysis of the relationship between HIV infection and risk for depressive disorders. *American Journal of Psychiatry*, 158, 725–730.

Collin, S.M., Chisegna, M.M., Kasonka, L., Haworth, A., Young, C., Filteu, S. & Murray, S.F. (2006). Factors associated with postpartum physical and mental morbidity among women with known HIV status in Lusaka, Zambia. *AIDS Care*, 18(7), 812–820.

Cooper, P.J., Tomlinson, M., Swartz, L., Landman, M., Molteno, C., Stein, A., … Murray, L. (2009b). Improving quality of mother-infant relationship and infant attachment in socioeconomically deprived community in South Africa: Randomised controlled trial. *British Medical Journal*, 338, b974.

Cooper, P.J., Tomlinson, M., Swartz, L., Woolgar, M., Murray, L. & Molteno, C. (1999). Post-partum depression and the mother-infant relationship in a South African peri-urban settlement. *British Journal of Psychiatry*, 175, 554–558.

DeWolff, M.S. & Van Ijzendoorn, M.H. (1997). Sensitivity and attachment: A meta-analysis on parental antecedents of infant attachment. *Child Development*, 68, 571–591.

Drewett, R., Wolke, D., Asefa, M., Kaba, M. & Tessema, F. (2001). Malnutrition and mental development: Is there a sensitive period? A nested case-control study. *Journal of Child Psychology and Psychiatry and Allied Disciplines*, 42(2), 181–187.

Drotar, D., Olness, K., Wiznitzer, M., Guay, L., Marum, L., Svilar, G., … Kiziri-Mayengo, R. (1997). Neurodevelopmental outcomes of Ugandan infants with human immunodeficiency virus type 1 infection. *Pediatrics*, 100, 5.

Dunn, L.M. & Dunn, D.M. (2007). *Peabody Picture Vocabulary Test*, 4th edn. London: Pearson.

Frankenburg, W.K., Dodds, J., Archer, P., Shapiro, H. & Bresnick, B. (1992). The Denver II: A major revision and restandardization of the Denver Developmental Screening Test. *Pediatrics*, 89, 91–97.

Galler, J.R., Harrison, R.H., Ramsey, F., Forde, V. & Butler, S.C. (2000). Maternal depressive symptoms affect infant cognitive development in Barbados. *Journal of Abnormal Child Psychology*, 41(6), 747–757.

Galler, J.R., Ramsey, F., Harrison, R.H., Taylor, J., Cumberpatch, G. & Forde, V. (2004). Postpartum maternal moods and infant size predict performance on a national high school entrance examination. *Journal of Child Psychology and Psychiatry*, 45(6), 1064–1075.

Goldberg, D. & Goodyer, I. (2005). *The Origins and Course of Common Mental Disorders*. London Routledge.

Grace, J., Lee, K.K., Ballard, C. & Herbert, M. (2001). The relationship between post-natal depression, somatization and behaviour in Malaysian women. *Transcultural Psychiatry*, 38(1), 27–34.

Grantham-McGregor, S. & Baker-Henningham, H. (2005). Review of the evidence linking protein and energy to mental development. *Public Health Nutrition*, 8(7A), 1191–1201.

Grantham-McGregor, S.M., Lira, P.I., Ashworth, A., Morris, S.S. & Assuncao, A.M. (1998). The development of low birth weight term infants and the effects of the environment in northeast Brazil. *Journal of Pediatrics*, 132(4), 661–666.

Grantham-McGregor, S.M., Powell, C.A., Walker, S.P. & Himes, J.H. (1991). Nutritional supplementation, psychosocial stimulation, and mental development of stunted children: The Jamaican study. *The Lancet*, 38, 1.

Griffiths, R. (1954). *The Abilities of Babies.* London: University of London Press.

Hadley, C., Tegegn, A., Tessema, F., Asefa, M. & Galea, S. (2008). Parental symptoms of common mental disorders and children's social, motor, and language development in sub-Saharan Africa. *Annals of Human Biology*, 35(3), 259–275.

Hadley, C., Tegegn, A., Tessema, F., Asefa, M., Galea, S., Hadley, C. (2008). Parental symptoms of common mental disorders and children's social, motor, and language development in sub-Saharan Africa. *Annals of Human Biology*, 35(3), 259–275.

Hamadani, J.D., Tofail, F., Hilaly, A., Mehrin, F., Shiraji, S., Banu, S. & Huda, S.N. (2012). Association of postpartum maternal morbidities with children's mental, psychomotor and language development in rural Bangladesh. *Journal of Health, Population & Nutrition*, 30(2), 193–204.

Hanlon, C. (2009). Perinatal common mental disorders in Ethiopia: Sociocultural factors in onset, remission and maintenance. PhD dissertation, University of London.

Hanlon, C., Medhin, G., Alem, A., Araya, M., Abdulahi, A., Hughes, M., … Prince, M. (2008a). Detecting perinatal common mental disorders in Ethiopia: Validation of the self-reporting questionnaire and Edinburgh Postnatal Depression Scale. *Journal of Affective Disorders*, 108, 251–262.

Hanlon, C., Medhin, G., Alem, A., Araya, M., Abdulahi, A., Tesfaye, M., … Prince, M. (2008b). Measuring common mental disorders in women in Ethiopia: Reliability and

construct validity of the comprehensive psychopathological rating scale. *Social Psychiatry and Psychiatric Epidemiology*, 43, 653–659.

Hanlon, C., Medhin, G., Alem, A., Araya, M., Abdulahi, A., Tomlinson, M., … Prince, M. (2010). Sociocultural practices in Ethiopia: Association with onset and persistence of postnatal common mental disorders. *British Journal of Psychiatry,* 197, 468-475.

Hanlon, C., Medhin, G., Alem, A., Tesfaye, F., Lakew, Z., Worku, B., … Prince, M. (2009). Impact of antenatal common mental disorders upon perinatal outcomes in Ethiopia: The P-MaMiE population-based cohort study. *Tropical Medicine & International Health*, 14(2), 156–166.

Hanlon, C., Medhin, G., Worku, B., Baheretibeb, Y., Dewey, M., … Prince, M. (2011). Maternal common mental disorders and CHILD development at 2.5 and 3.5 years: The Ethiopian P-MaMiE birth cohort. Unpublished report.

Hanlon, C., Medhin, G., Worku, B., Tomlinson, M., Alem, A., Dewey, M. & Prince, M. (2016). Adapting the Bayley Scales of infant and toddler development in Ethiopia: Evaluation of reliability and validity. *Child: Care, Health and Development*, 42(5), 699–708.

Harpham, T., Huttly, S., De Silva, M.J. & Abramsky, T. (2005). Maternal mental health and child nutritional status in four developing countries. *Journal of Epidemiology and Community Health*, 59, 1060–1064.

Hay, D.F., Pawlby, S., Sharp, D., Asten, P., Mills, A. & Kumar, R. (2001). Intellectual problems shown by 11-year-old children whose mothers had postnatal depression. *Journal of Child Psychology & Psychiatry*, 42(7), 871–889.

Kermoian, R. & Leiderman, P. (1986). Infant attachment to mother and child caretaker in an East African community. *International Journal of Behavioral Development*, 9, 455–469.

Kilbride, P. & Kilbride, J. (1974). Sociocultural factors and the early manifestation of sociability behavior among Baganda infants. *Ethos*, 2, 296–314.

Klein, R.B. (1998). *Principles and Practice of Structural Equation Modeling.* New York: Guilford.

Lewis, G. (1992). Dimensions of neurosis. *Psychological Medicine*, 22, 1011–1018.

Maselko, J., Sikander, S., Bhalotra, S., Bangash, O., Ganga, N., Mukherjee, S., … Rahman, A. (2015). Effect of an early perinatal depression intervention on long-term child development outcomes: Follow-up of the Thinking Healthy Programme randomised controlled trial. *The Lancet Psychiatry*, 2(7), 609–617.

Medhin, G., Hanlon, C., Dewey, M., Alem, A., Tesfaye, F., Lakew, Z., … Prince, M. (2010). The effect of maternal common mental disorders on infant undernutrition in Butajira, Ethiopia: The P-MaMiE study. *BMC Psychiatry*, 10, 32.

Mulatu, M.S. (1995). Prevalence and risk factors of psychopathology in Ethiopian children. *Journal of the American Academy of Child and Adolescent Psychiatry*, 34(1), 100–109.

Murray, L., Cooper, P., Arteche, A., Stein, A. & Tomlinson, M. (2016). Randomized controlled trial of a home-visiting intervention on infant cognitive development in peri-urban South Africa. *Developmental Medicine and Child Neurology*, 58(3), 270–276.

Murray, L. & Cooper, P.J. (1997). Postpartum depression and child development. *Psychological Medicine*, 27(2), 253–260.

Murray, L., Fiori-Cowley, A., Hooper, R. & Cooper, P. (1996). The impact of postnatal depression and associated adversity on early mother-infant interactions and later infant outcome. *Child Development*, 67(5), 2512–2526.

Nasreen, H-E., Nahar Kabir, Z., Forsell, Y. & Edhborg, M. (2013). Impact of maternal depressive symptoms and infant temperament on early infant growth and motor development: Results from a population based study in Bangladesh. *Journal of Affective Disorders*, 146(2), 254–261.

Nasreen, H.E., Kabir, Z.N., Forsell, Y. & Edhborg, M. (2010). Low birth weight in offspring of women with depressive and anxiety symptoms during pregnancy: Results from a population based study in Bangladesh. *BMC Public Health*, 10(1), 515.

Ndokera, R. & MacArthur, C. (2011). The relationship between maternal depression and adverse infant health outcomes in Zambia: A cross-sectional feasibility study. *Child: Care, Health and Development*, 37, 74-81.

Niemi, M., Falkenberg, T., Petzold, M., Chuc, N.T.K. & Patel, V. (2013). Symptoms of antenatal common mental disorders, preterm birth and low birthweight: A prospective cohort study in a semi-rural district of Vietnam. *Tropical Medicine & International Health*, 18(6), 687–695.

O'Connor, T.G., Heron, J. & Glover, V. (2002). Antenatal anxiety predicts child behavioral/emotional problems independently of postnatal depression. *Journal of the American Academy of Child & Adolescent Psychiatry*, 41(12), 1470–1477.

O'Connor, T.G., Heron, J., Golding, J. & Glover, V. (2003). Maternal antenatal anxiety and behavioural/emotional problems in children: A test of a programming hypothesis. *Journal of Child Psychology and Psychiatry*, 44(7), 1025–1036.

Okronipa, H.E., Marquis, G.S., Lartey, A., Brakohiapa, L., Perez-Escamilla, R. & Mazur, R.E. (2012). Postnatal depression symptoms are associated with increased diarrhea among infants of HIV-positive Ghanaian mothers. *AIDS and Behavior*, 16(8), 2216–2225.

Parsons, C.E., Young, K.S., Rochat, T.J., Kringelbach, M.L. & Stein, A. (2012). Postnatal depression and its effects on child development: A review of evidence from low- and middle-income countries. *British Medical Bulletin*, 101, 57–79.

Patel, V., DeSouza, N. & Rodrigues, M. (2003). Postnatal depression and infant growth and development in low income countries: A cohort study from Goa, India. *Archives of Disease in Childhood*, 88(1), 34–37.

Patel, V. & Prince, M. (2006). Maternal psychological morbidity and low birth weight in India. *British Journal of Psychiatry*, 188, 284–285.

Patel, V., Rahman, A., Jacob, K.S. & Hughes, M. (2004). Effect of maternal mental health on infant growth in low income countries: New evidence from South Asia. *British Medical Journal*, 328(7443), 820–823.

Pawlby, S., Sharp, D., Hay, D. & O'Keane, V. (2008). Postnatal depression and child outcome at 11 years: The importance of accurate diagnosis. *Journal of Affective Disorders*, 107, 241–245.

Peterson, N., Drotar, D., Olness, K., Guay, L. & Kiziri-Mayengo, R. (2001). The relationship of maternal and child HIV infection to security of attachment among Ugandan infants. *Child Psychiatry and Human Development*, 32(1), 3–17.

Phatak, P. (1998). *Developmental Assessment Scales for Indian Infants.* Pune: Anand Agencies.

Rahman, A., Bunn, J., Lovel, H. & Creed, F. (2007a). Association between antenatal depression and low birthweight in a developing country. *Acta Psychiatrica Scandinavica*, 115(6), 481–486.

Rahman, A., Bunn, J., Lovel, H. & Creed, F. (2007b). Maternal depression increases infant risk of diarrhoeal illness: A cohort study. *Archives of Disease in Childhood*, 92(1), 24–28.

Rahman, A., Harrington, R. & Bunn, J. (2002). Can maternal depression increase infant risk of illness and growth impairment in developing countries? *Child: Care, Health and Development*, 28(1), 51–56.

Rahman, A., Iqbal, Z., Bunn, J., Lovel, H. & Harrington, R. (2004). Impact of maternal depression on infant nutritional status and illness: A cohort study. *Archives of General Psychiatry*, 61(9), 946–952.

Rahman, A., Malik, A., Sikander, S., Roberts, C. & Creed, F. (2008). Cognitive behaviour therapy-based intervention by community health workers for mothers with depression and their infants in rural Pakistan: A cluster-randomised controlled trial. *The Lancet*, 372(9642), 902–909.

Ramchandani, P., Stein, A., Evans, J., O'Connor, T.G. & the ALSPAC Study Team. (2005). Paternal depression in the postnatal period and child development: A prospective population study. *The Lancet*, 365, 2201–2205.

Richman, N. & Graham, P.J. (1971). A behavioural screening questionaire for use with three year old children. *Journal of Child Psychology and Psychiatry and Allied Disciplines*, 12, 5–33.

Ross, J., Hanlon, C., Medhin, G., Alem, A., Tesfaye, F., Worku, B., … Prince, M. (2010). Perinatal mental distress and infant morbidity in Ethiopia: A cohort study. *Archives of Disease in Childhood, Fetal Neonatal Edition*, 96(1), F59–64.

Sabet, F., Richter, L.M., Ramchandani, P.G., Stein, A., Quigley, M.A. & Norris, S.A. (2009). Low birthweight and subsequent emotional and behavioural outcomes in 12-year-old children in Soweto, South Africa: Findings from Birth to Twenty. *International Journal of Epidemiology*, 38(4), 944–954.

Sawyer, A., Ayers, S. & Smith, H. (2010). Pre- and postnatal psychological wellbeing in Africa: A systematic review. *Journal of Affective Disorders*, 123(1–3), 17–29.

Servili, C., Medhin, G., Hanlon, C., Tomlinson, M., Worku, B., Baheretebeb, Y., … Prince, M. (2010). Maternal common mental disorders and infant development in Ethiopia: The P-MaMiE birth cohort. *BMC Public Health*, 10, 693.

Sigman, M., Neumann, C., Baksh, M., Bwibo, N. & McDonald, M.A. (1989). Relationship between nutrition and development in Kenyan toddlers. *Journal of Pediatrics*, 115(3), 357–364.

Sigman, M., Neumann, C., Carter, E., Cattle, D.J., D'Souza, S. & Bwibo, N. (1988). Interactions and the development of Embu toddlers in Kenya. *Child Development*, 59(5), 1251–1261.

Stewart, R.C., Umar, E., Kauye, F., Bunn, J., Vokhiwa, M., Fitzgerald, M., … Creed, F. (2008). Maternal common mental disorder and infant growth: A cross-sectional study from Malawi. *Maternal and Child Nutrition*, 4, 209–219.

Streiner, D.L. (2005). Finding our way: An introduction to path analysis. *Canadian Journal of Psychiatry*, 50, 115–122.

Surkan, P.J., Kennedy, C.E., Hurley, K.M. & Black, M.M. (2011). Maternal depression and early childhood growth in developing countries: Systematic review and meta-analysis. *Bulletin of the World Health Organization*, 287, 607–615.

Tadesse, B., Kebede, D., Tegegne, T. & Alem, A. (1999). Childhood behavioural disorders in Ambo district, western Ethiopia. I. Prevalence estimates. *Acta Psychiatrica Scandinavica, Supplementum*, 397, 92–97.

Tomita, A., Labys, C.A. & Burns, J.K. (2015). Depressive symptoms prior to pregnancy and infant low birth weight in South Africa. *Maternal and Child Health Journal*, 19(10), 2179–2186.

Tomlinson, M., Cooper, P. & Murray, L. (2005). The mother-infant relationship and infant attachment in a South African peri-urban settlement. *Child Development*, 76(5), 1044–1054.

Tomlinson, M., Cooper, P.J., Stein, A., Swartz, L. & Molteno, C. (2006). Post-partum depression and infant growth in a South African peri-urban settlement. *Child: Care, Health & Development*, 32(1), 81–86.

Tran, T.D., Biggs, B.A., Tran, T., Simpson, J.A., De Mello, M.C., Hanieh, S., … Fisher, J. (2014). Perinatal common mental disorders among women and the social and emotional development of their infants in rural Vietnam. *Journal of Affective Disorders*, 160, 104–112.

Tran, T.D., Biggs, B.A., Tran, T., Simpson, J.A., Hanieh, S., Dwyer, T. & Fisher, J. (2013). Impact on infants' cognitive development of antenatal exposure to iron deficiency disorder and common mental disorders. *PLoS ONE* (Electronic Resource), 8(9), e74876.

Tran, T.D., Tran, T., Simpson, J.A., Tran, H.T., Nguyen, T.T., Hanieh, S., … Fisher, J. (2014). Infant motor development in rural Vietnam and intrauterine exposures to anaemia, iron deficiency and common mental disorders: A prospective community-based study. *BMC Pregnancy and Childbirth*, 14(1), 8.

True, M.M., Pisani, L. & Oumar, F. (2001). Infant–mother attachment among the Dogon of Mali. *Child Development*, 72(5), 1451–1466.

Valenzuela, M. (1990). Attachment in chronically underweight young children. *Child Development*, 61, 1984–1996.

Wado, Y.D., Afework, M.F. & Hindin, M.J. (2014). Effects of maternal pregnancy intention, depressive symptoms and social support on risk of low birth weight: A prospective study from Southwestern Ethiopia. *PLoS ONE*, 9(5), e96304.

Walker, S.P., Chang, S.M., Powell, C.A. & Grantham-McGregor, S.M. (2005). Effects of early childhood psychosocial stimulation and nutritional supplementation on cognition and education in growth-stunted Jamaican children: Prospective cohort study. *The Lancet*, 366, 1804–1807.

Walker, S.P., Wachs, T.D., Gardner, J.M., Lozoff, B., Wasserman, G.A., Pollitt, E., … Carter, J.A. (2007). Child development: Risk factors for adverse outcomes in developing countries. *The Lancet*, 369(9556), 145–157.

Chapter 6

Child development and HIV/AIDS in sub-Saharan Africa

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Introduction

We do not know when exactly HIV reached sub-Saharan Africa; however, in the years since, the virus has resulted in millions of deaths, and in 2015, 25.5 million people were living with HIV.[1] The majority of the HIV-positive population are those of parenting age, although there are also high levels of infection among teenagers,[2] and particularly girls.[3] HIV/AIDS impacts child development in two main ways. The first impact is through infection. Infection can take place at birth or through breastfeeding (often referred to as 'perinatal' or 'vertical' transmission). Infants, children and adolescents may also be infected via abuse, about which little is known. In addition, teenagers and young people who are sexually active, but who often lack the knowledge, power or means to protect themselves, are also at risk of contracting HIV.

The second major impact involves the effects of HIV/AIDS on the family, including parents and/or caregivers of children, as well as children themselves. In particular, HIV/AIDS-orphanhood and caregiver AIDS-sickness is often associated with the loss of one or more wage earners, with severe consequences for the family.[4] Much research examining the effects of familial HIV/AIDS on children has focused on orphaned children; however, in recent years there has been a growing recognition that orphanhood is not an event, but is rather a process—children's experiences often move from parental illness to bereavement, sometimes accompanied by the illness and death of siblings.[5] Disclosure of parental HIV-status can take place at any point

1 Joint United Nations Programme on HIV/AIDS (UNAIDS), 2015b.
2 United Nations Children's Fund (UNICEF), 2013.
3 Pettifor et al., 2013, pp. 155–160.
4 Booysen, 2002, pp. 1193–1215; Booysen, 2004, pp. 522–545.
5 Richter et al., 2006.

in this process, and frequently never takes place at all,[6] leaving children in a state of 'knowing but not knowing'. The illness of caregivers, parents and siblings can lead to children having to take on caregiving roles in the context of chronic and worsening opportunistic infections. International evidence shows that families' health and well-being are interconnected in other negative situations such as divorce, illnesses such as cancer, and parental psychiatric disorders.[7] In the case of HIV/AIDS, this may be even further intensified, with the economic, physical and mental health status of caregivers directly impacting the well-being of their children.[8]

These two sets of impacts (being 'infected' and 'affected' by HIV/AIDS) are closely connected. In Africa, HIV/AIDS is a family disease, and over time children can often experience the infection and death of family members, as well as their own infection and coming to terms with medication, illness and sometimes death. This chapter reviews the developmental outcomes of children infected and affected by HIV/AIDS in sub-Saharan Africa across five key areas of concern: physical, mental, and sexual health, abuse, and educational impacts. Each section summarises research focusing on both HIV-infected children and children affected by HIV/AIDS, and is concluded with a brief summary of what the research evidence implies for future intervention efforts. This is a relatively new field of research and little more than a decade of evidence exists. This chapter aims to highlight both what we know as well as the current gaps in our understanding.

Physical health and HIV/AIDS

HIV-infection presents major threats to children's development and health. In 2014, an estimated 2.6 million children under 15 years old were infected with HIV across the sub-Saharan African region.[9] In South Africa alone, 240 000 children were living with HIV. Infection among infants and young children is largely through parent-to-child transmission. There have been enormous advances in the prevention of mother-to-child transmission (PMTCT) through provision of antiretroviral (ARV) treatment for mothers and children around birth. With no access to PMTCT, infection rates have been found to be as high as 20–45 per cent, but this has been shown to be reduced to 2 per cent where full services are available. However, access to PMTCT services remains variable, with only 68 per cent current coverage in sub-Saharan Africa.[10] Option B+ is now recommended—with pregnant women starting lifetime ARVs regardless of illness progression. However, recent evidence suggests that

6 Rochat et al., 2011, pp. 687–696.
7 Stein et al., 2008.
8 Skeen et al., 2014.
9 UNAIDS, 2015a.
10 UNAIDS et al., 2013.

more work needs to be done to ensure adherence, especially for younger and more vulnerable mothers. For children who are HIV-positive, early diagnosis and access to lifelong ARV treatment is essential. Rochat et al. (2008) report that mortality without ARVs is 33 per cent by the first year, 50 per cent by two years and 60 per cent by three years. Most deaths are from tuberculosis, pneumonia, chronic diarrhoea and malnutrition.[11] With ARV provision and access to second-line and further drugs in case of resistance, perinatally infected children are now surviving into adulthood. However, access for children to early diagnosis and ARVs remains far below that of adults.[12] If we are to improve survival rates, it is essential that the efforts to 'scale up' access to ARVs are extended to children.[13]

Physical health impacts of HIV/AIDS are not restricted to those children who are HIV-infected.[14] There is evidence that children living in HIV/AIDS-affected homes have negative physical health impacts, independent of vertical HIV-infection.[15] A study in rural and urban South Africa, with 5 200 participants, found that children with AIDS-sick caregivers (whether biological parents or not) have twice the incidence of illnesses such as worms, diarrhoea and bronchitis, and five times higher risk for TB infection than children in healthy households.[16] The study showed extremely low levels of TB testing—around 4 per cent for children in HIV/AIDS-affected homes—suggesting that health systems could valuably improve child outcomes by testing for TB among all children in homes with HIV-positive residents. Other evidence from sub-Saharan Africa has also shown beneficial health outcomes associated with interventions guided towards AIDS-affected families. In Uganda, one study found nutritional status improved and growth stunting dropped in children of HIV-positive parents when their parents began ARVs.[17] The investigators suggest that poor nutrition and growth stunting is closely linked to the massive economic shock of an adult unable to earn wages due to AIDS-illness, and that improvements in health due to ARV use is associated with improved access to food for children.

Evidence also shows negative health impacts for HIV/AIDS-orphaned children. However, it is unclear to what extent these impacts are associated with child HIV-infection or whether these impacts are experienced by all orphaned children (rather than specifically HIV/AIDS-orphaned children). In Tanzania, children aged under five years who were orphaned by HIV/AIDS showed raised morbidity and

11 Rochat et al., 2008.
12 UNICEF, 2013.
13 Bekker, 2015, pp. 1–7.
14 Gray et al., 2006, p. 15; Lindblade et al., 2003, pp. 67–72; Watts et al., 2007, pp. 584–593.
15 Thurman & Kidman, 2011.
16 Cluver, Orkin, Kuo et al., 2011.
17 Graff Zivin et al., 2009, pp. 1008–1015.

reduced height-for-age.[18] In Uganda, orphaned children showed more stunting and wasting, and more fevers, coughing and diarrhoea, although HIV-infection rates were not known.[19]

The available research strongly suggests that child health can be improved by reducing the illness of parents or guardians through the provision of ARVs. Research also suggests that screening, treatment and nutritional support for children in HIV/AIDS-affected homes need to be enhanced. It is also clear that we need to conduct more rigorous research on the physical health impacts of HIV/AIDS-orphanhood or having an AIDS-sick caregiver, and on the causal factors that lead to negative outcomes.

Mental health and coping

We do not yet fully understand the impacts of child HIV-infection on children's mental health; however, initial evidence from sub-Saharan Africa and evidence from the United States suggests both increased mental health and cognitive challenges and great hope. HIV-infection raises the risk of neurological disorders and impairments in motor, mental, language, learning and emotional development.[20] These delays can lead to educational difficulties, often compounded by missing school due to frequent hospitalisation, and stigma within school environments from teachers and classmates.[21] Qualitative studies with HIV-positive children report psychosocial difficulties related to bereavement, coming to terms with their HIV-status and stigma,[22] and quantitative research reports mental health problems linked to reduced ART-adherence,[23] which is a major problem—particularly for adolescents.[24] There can also be psychosocial impacts of the side-effects of ARV medication, for example, lipodystrophy syndrome, which includes fat loss and/or accumulation in distinct areas of the body and is closely linked to stigmatisation and psychological distress.[25] It is clear that, for infected children, the biological impacts of the virus and of medication are enmeshed in the social and familial impacts of HIV/AIDS.[26]

18 Ainsworth & Semali, 2000.
19 Sarker et al., 2005, pp. 10–215.
20 Rochat et al., 2008; Sherr, 2005; Sherr … Herrero Romero, 2014, pp. 74–89.
21 Deacon & Stephney, 2007.
22 Woollett et al., 2016, pp. 269–275.
23 Lowenthal et al., 2012, pp. 722–727.
24 Nachega et al., 2009, pp. 65–71.
25 Power et al., 2003, pp. 137–141.
26 Mellins et al., 2009, pp. 810–819; Mellins et al., 2007, pp. 384–393; Mellins et al., 2011, pp. 413–422.

There is now conclusive evidence from sub-Saharan Africa that exposure to HIV[27] and orphanhood by HIV/AIDS is associated with negative mental health impacts.[28] Similar findings have been obtained in China and the United States.[29] In particular, HIV/AIDS-orphaned children are at greatly heightened risk of internalising disorders such as depression and anxiety (Figure 6.1). In South Africa, AIDS-orphaned children were 117 per cent more likely to be suffering from post-traumatic stress disorder than non-orphaned children, and 67 per cent more likely than children orphaned by other causes such as homicide, cancer and road-traffic accidents.[30] Longitudinal evidence also shows that mental health status worsens over a four-year period for AIDS-orphaned children, with increased distress among older adolescent and young adult orphans.[31]

Additionally, evidence suggests that the psychosocial distress associated with HIV/AIDS-orphanhood may start long before parental death. Studies of children with AIDS-sick caregivers show increased and long-term risks of internalising psychological disorders.[32] Qualitative evidence suggests that children in sub-Saharan Africa frequently act as 'young carers' for unwell adult caregivers,[33] and qualitative work suggests that this can lead to a sense of contributing to the family needs, but also substantial distress.[34]

Given the increasing evidence of psychopathology among both HIV-infected and HIV/AIDS-affected children, there is little available research to determine the effectiveness of interventions in sub-Saharan Africa. In high-income countries, perinatally infected children are often provided with intensive psychological, medical and educational support.[35] In contrast, service provision in sub-Saharan Africa remains scattered, although a recent Cochrane review[36] found a small number of included studies of psychosocial-support interventions for HIV/AIDS-affected children—suggesting encouraging progression in the evidence base. Ongoing randomised trials in southern Africa also suggest promising outcomes of parenting

27 Sherr et al., 2014, pp. 2059–2074.
28 Atwine et al., 2005, pp. 555–564; Cluver et al., 2007, pp. 755–763; Makame et al., 2002, pp. 459–465; Nyamukapa et al., 2008, pp. 133–141.
29 Fang et al., 2009, pp. 1053–1062; Forehand et al., 2002, pp. 579–600; Rotheram-Borus et al., 1999, pp. 367–372.
30 Cluver, 2011, pp. 27–29.
31 Cluver, Orkin, Gardner et al., 2011, pp. 363–370.
32 Bauman et al., 2006, p. 56; Bauman et al., 2007, pp. 1141–1147; Cluver, Orkin, Gardner et al., 2011, pp. 363–370.
33 Evans & Becker, 2010; Robson, 2000, pp. 59–69.
34 Skovdal, 2011, pp. 452–453.
35 Mellins et al., 2006, pp. 432–437.
36 Skeen et al., 2014.

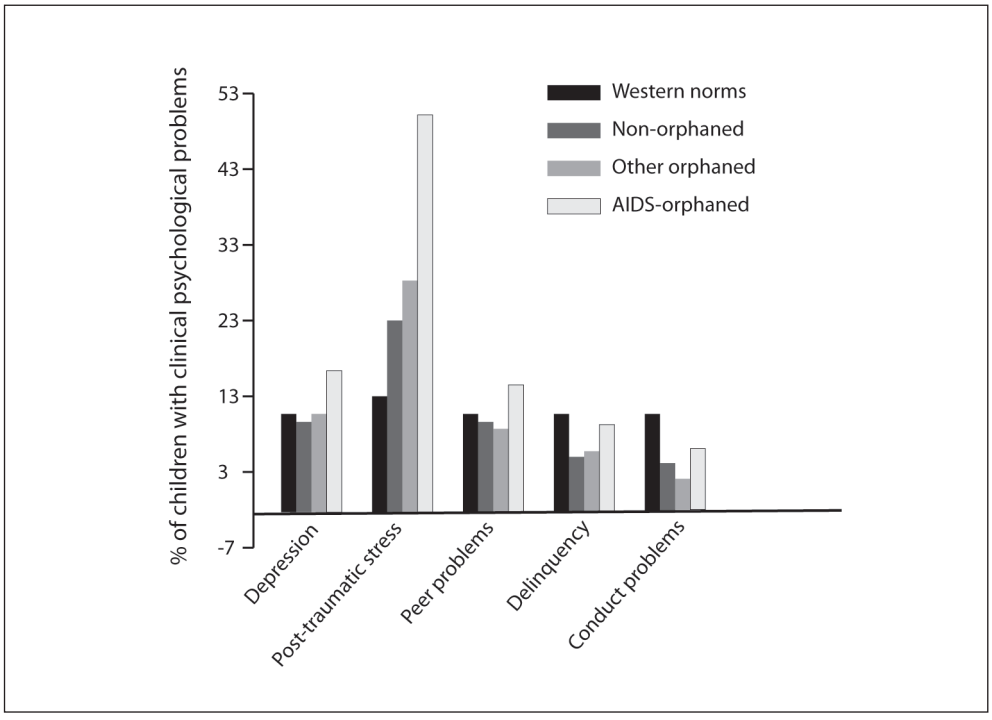

Figure 6.1: Proportions of children in range for clinical-level disorder in South Africa

Source: Cluver et al., 2007, pp. 755–763

programmes,[37] following recommendations from the Joint Learning Initiative for Children Affected by AIDS, which stressed the importance of supporting families to provide care for affected children.[38] New studies in schools suggest that teacher training and support programmes can also provide psychosocial support to vulnerable children.[39] Community-based adherence support (home visitors) has been shown to increase rates of adherence among HIV positive children,[40] and a study of community-based organisations across southern and eastern Africa showed mental health improvements among children.[41] In Uganda, peer-group support and medical

37 Bhana et al., 2014, pp. 1–11; Cluver et al., 2016, p. 328.
38 Richter & Sherr, 2009, pp. 1–2.
39 Kaljee et al., 2016, pp. 1–12.
40 Grimwood et al., 2012, p. 17381.
41 Sherr et al., 2016.

care reduced psychological distress among orphaned children,[42] and in Rwanda, positive impacts of mentor support were seen for youth-headed households.[43]

It is also clear from international research that there are close linkages between child and parent mental health. Studies of parents with other illnesses, such as cancer, mental health problems, and drug or alcohol abuse, show strong and bidirectional impacts on child functioning.[44] There is strong evidence of higher levels of depression and anxiety among people living with HIV, particularly mothers,[45] and among caregivers of HIV/AIDS-affected children,[46] suggesting that to maximise impact, psychosocial interventions may need to be focused on families rather than on children alone.[47] Qualitative studies may be especially important in exploring family-based and community-based ideas about sources of resiliency among children, such as in Rwanda, where caregivers identified the need for positive verbal communication, showing physical affection and being good listeners,[48] and in Kenya, where children reported positive psychosocial impacts of income generation.[49] New evidence shows benefits of family-focused interventions, for example, mentor mother-support programmes for HIV-infected mothers.[50]. A recent randomised trial of a disclosure-support programme in South Africa suggests positive benefits for both HIV-positive parents and their children.[51] Disclosure to children of their own HIV-positive status is associated with improved ARV adherence,[52] and new evidence suggests positive impacts of social and economic provisions such as HIV-support groups, food security and parental supervision.[53]

Sexual health and risk of HIV-infection

For children born HIV-negative, but in AIDS-affected families, increasing evidence demonstrates sexual-health risks which lead to higher rates of HIV-infection (particularly among girls). In a literature review,[54] Cluver and Operario (2008) found four studies of rates of HIV-infection among orphaned children in sub-Saharan

42 Kumakech et al., 2009, pp. 1038–1043.
43 Brown et al., 2009, pp. 288–299.
44 Stein et al., 2008.
45 Rochat et al., 2006, pp. 1376–1378; Stein et al., 2005, pp. 116–118.
46 Kuo et al., 2013, pp. 1755–1763.
47 Tomlinson, 2010, p. 9.
48 Betancourt et al., 2011, pp. 693–701.
49 Skovdal, 2010, pp. 1652–1661.
50 Tomlinson et al., 2014, pp. 256–266.
51 Rochat et al., 2013, p. 147.
52 Cluver et al., 2015, pp. 57–65.
53 Cluver, Toska et al., 2016, pp. 73–82.
54 Cluver & Operario, 2008, pp. 28–35.

Africa. A population survey of 15–19 year olds in Zimbabwe found female orphans more likely to be HIV-positive than non-orphans.[55] Also in Zimbabwe, a study of 1 283 15–19 year olds found orphan status among girls to be associated with HIV-infection, herpes simplex virus-2 and a history of pregnancy.[56] In South Africa, a nationally representative household survey found female orphans more likely to be HIV-positive independently of socio-economic factors.[57] Further research shows higher rates of sexual behaviour among orphaned children. In South African, Zimbabwean and Kenyan studies, orphaned children were more likely to have had sex than non-orphaned children of the same age.[58] Reviews of Demographic and Household Survey data from five sub-Saharan African countries found a lower age of sexual debut among orphaned children, and particularly double-orphans.[59] In sub-Saharan African countries, with high overall prevalence of HIV, early sexual debut remains a key risk factor for HIV-infection.

A recent longitudinal study in South Africa may provide clues to some of the linkages between HIV/AIDS-orphanhood and HIV-infection. It found five times higher rates of transactional sexual exploitation (sex in return for money, school fees, transport or shelter) among girls in HIV/AIDS-affected families, compared to healthy families. Transactional sex is a major driver of HIV-infection, as the age and power disparities between partners reduce capacity to negotiate condom use.[60] These increased levels of transactional sex among AIDS-affected girls were largely driven by the increased poverty and abuse which they were experiencing, and these factors acted in a compound manner. For example, 1 per cent of girls in healthy families with no abuse and enough to eat reported transactional sex, compared to 57 per cent among girls with AIDS-sick caregivers, abuse and food insecurity[61] (see Figure 6.3).

In recent years, there has been increased research on social protection as a protective factor against HIV-infection in highly vulnerable adolescents. In a cluster randomised trial, the Kenyan orphans and vulnerable children (OVC) cash transfer was shown to reduce pregnancy and sexual debut,[62] and in South Africa, combinations of 'cash plus care' (economic and psychosocial provisions, including good parenting and respectful clinic care) have enhanced impact on orphaned and AIDS-affected children[63] and for

55 Gregson et al., 2005, pp. 785–794.
56 Birdthistle et al., 2008, pp. 759–766.
57 Operario et al., 2008, pp. 173–186.
58 Nyamukapa et al., 2008, pp. 133–141; Thurman et al., 2006, pp. 627–635.
59 Campbell et al., 2008.
60 Dunkle et al., 2004, pp. 1581–1592; Dunkle et al., 2007, pp. 1235–1248.
61 Cluver, Orkin, Boyes et al., 2011, pp. 336–343.
62 Handa et al., 2014.
63 Cluver, Orkin, Yakubovich et al., 2016, pp. 96–104; Cluver, Orkin, Meinck et al., 2016, p. 20646.

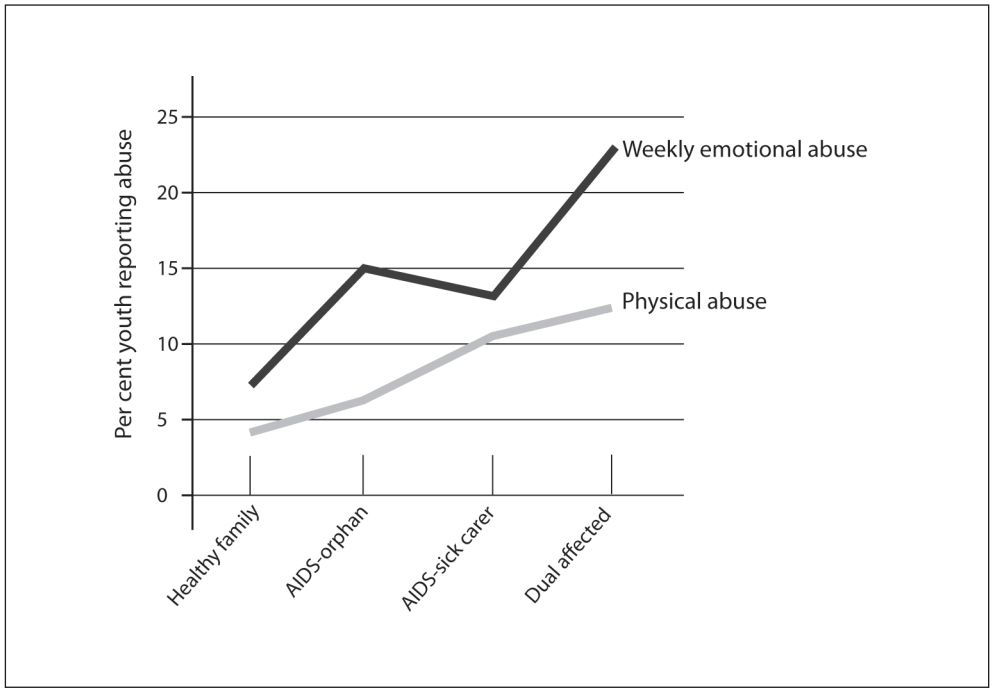

Figure 6.2: Cumulative effects of HIV/AIDS-orphanhood and caregiver AIDS-sickness on emotional and physical abuse[64]

Source: Cluver et al., 2011, pp. 336–343

HIV-positive children.[65] A recent study in Kenya showed impacts of provision of school uniforms on reduced HIV-risk behaviour for orphaned children.[66]

Abuse

New research has shown higher levels of child maltreatment in HIV/AIDS-affected families; in South Africa, HIV/AIDS-orphaned children and children living with AIDS-sick caregivers reported three times higher levels of physical and emotional abuse[67] (see Figure 6.2) and studies show associations between parental AIDS-illness and abuse.[68]

64 Cluver, Orkin, Boyes et al., 2011, pp. 336–343.
65 Toska et al., 2016, pp. 1–14.
66 Duflo et al., 2015, pp. 2257–2297.
67 Cluver, Orkin, Boyes et al., 2011, pp. 336–343.
68 Meinck et al., 2015, p. 444; Meinck et al., 2015, pp. 81–107.

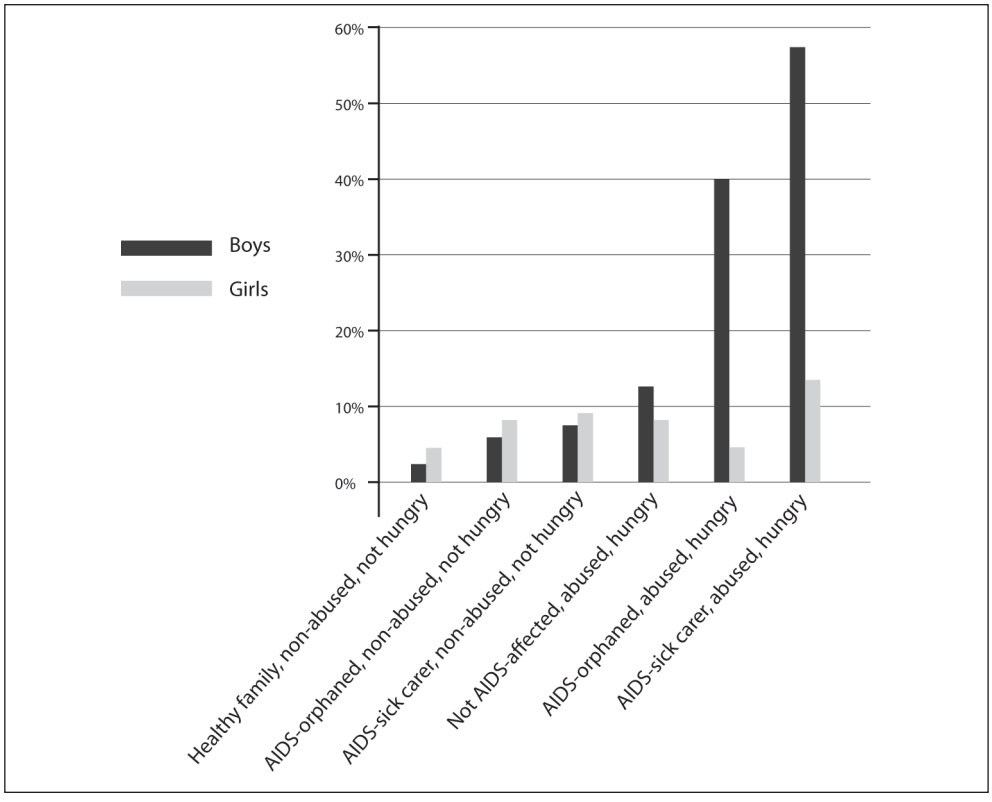

Figure 6.3: Cumulative effects of familial AIDS, abuse and food insecurity on risk of transactional sex among boys and girls aged 15–24 years

Source: Cluver et al., 2011, pp. 336–343

The increased level of physical and emotional abuse in HIV/AIDS-affected families is likely driven by increased stress on caregivers, food insecurity and lowered social support due to HIV/AIDS-related stigma.[69] Studies show exceptionally high levels of depression among pregnant HIV-positive women[70] and mothers[71] and data show that AIDS-sick caregivers and those caring for HIV/AIDS-orphaned children have greater difficulty in parenting, but that this is driven by increased poverty and reduced levels of social support.[72] These findings suggest the importance of practitioners, teachers and child-protection services being alert to heightened risk of emotional and

69 Meinck et al., 2016, pp. 1–7.
70 Rochat et al., 2006, pp. 1376–1378.
71 Brandt, 2007.
72 Lachman et al., 2014, pp. 304–313.

physical abuse among HIV/AIDS-affected children. It will be important to review the emerging findings of randomised trials of parenting programmes aiming to reduce child abuse in the region.[73]

Educational needs

Research shows negative impacts of family AIDS-illness and death on school enrolment, attendance and achievement, mediated by increased poverty and mental health problems.[74] In addition, HIV-positive children are at high risk for school challenges due to sickness, cognitive complications of HIV-infection and HIV-related stigma.[75] In sub-Saharan Africa, the costs of HIV/AIDS treatment and funerals frequently result in deficits in children's nutrition and education.[76] Analyses of the Demographic and Household Surveys and other data have shown that orphaned children are less likely to attend school[77] and less likely to complete primary school.[78] However, it is probable that these educational deficits experienced by orphans may actually reflect a longer cycle of educational disadvantage that begins with parental illness. Qualitative evidence also suggests challenges: Robson et al. (2000) interviewed nine young carers of AIDS-sick adults in Zimbabwe, and found that six had ceased school attendance.[79] Bauman et al. (2006) conducted research with 50 young carers in Zimbabwe who lived with an HIV-positive parent, and found 67 per cent reported interference with homework.[80] In Kenya, Skovdal et al. interviewed 48 children in AIDS-sick households.[81] They found that while all children struggled with school attendance and performance, they also reported that education gave a sense of normality and that teachers were sympathetic. Some continued to succeed despite high levels of absenteeism from school, but long-term, negative educational impacts were 'the greatest concern for many of these children'.

Research suggests that to improve educational outcomes for HIV/AIDS-affected children, we need to improve both food security (through cash transfers to poor families and school-feeding schemes) and child mental health.

73 Ward et al., 2015, pp. 49–54.
74 Orkin et al., 2013, pp. 343–350.
75 Sherr et al., 2014, pp. 2059–2074.
76 Booysen, 2002, pp. 1193–1215; Case & Ardington, 2005.
77 Campbell et al., 2008; Mishra et al., 2005.
78 Operario et al., 2008, pp. 173–186.
79 Robson, 2000, pp. 59–69.
80 Bauman et al., 2006, p. 56.
81 Skovdal et al., 2010, pp. 587–595.

Conclusions

So where are we now? We know, to a far better extent than a few years ago, what the problems are. Research evidence has clearly demonstrated major challenges for both HIV-infected and affected children in physical, mental and sexual health, as well as social development and education. We also understand far more about the linkages and overlaps between these groups, including HIV/AIDS-orphaned children and HIV-infected children, as well as children living with HIV/AIDS-affected caregivers. But we still have a long way to go. There is still limited research investigating interventions to reduce negative outcomes for children in families affected by HIV and AIDS. More research is needed, both into the efficacy of the many existing, untested interventions for affected and infected children, but also into new and innovative programmes.

We do, however, have evidence of more generalised interventions that can boost the health and well-being of children in sub-Saharan Africa. Increasing evidence shows positive impacts of cash transfers to poor families on a wide range of child outcomes.[82] Similarly, school nutrition programmes have been shown to improve educational outcomes.[83] The provision of free basic education in Kenya and South Africa has substantively increased child enrolment and attendance.

The challenges are great, but the outlook is one of hope. Sub-Saharan Africa is at the forefront of research and development of interventions for HIV-infected and affected children. With concerted and united efforts, and with the close collaboration of governments, non-governmental organisations, researchers and the communities most affected by HIV/AIDS, we can aim for scalable and efficacious interventions.

We remain with important unanswered questions, such as how to balance the need to target interventions to the most vulnerable groups in resource-constrained situations, with the danger that in doing so we potentially expose HIV/AIDS-affected families to stigma. We also have unexplored questions regarding the extent to which evidence-based interventions can be effectively implemented by lay workers in contexts of weak health systems and low human and management resources. These questions are essential to understanding how we are best to respond to the needs of millions of highly vulnerable children and their families. The United Nations' Sustainable Development Goals bring a reduction in emphasis on HIV as a standalone issue. In this new development context, interventions will also need to demonstrate impacts and cost-effectiveness across multiple outcomes.[84] But the rapid progression in evidence, and the expansion of social protection interventions such as cash transfer programmes across southern and eastern Africa, suggest that we are on our way.

82 Heise et al., 2013, p. 18615; Robertson et al., 2013, pp. 1283–1292; Taaffe et al., 2016, pp. 17–25.
83 Oldewage-Theron & Napier, 2011, pp. 283–292.
84 Remme et al., 2014, pp. 425–434.

References

Ainsworth, M. & Semali, I. (2000). *The Impact of Adult Deaths on Children's Health in Northwestern Tanzania*. World Bank Policy Research Working Paper No. 2266. Washington, DC: World Bank.

Atwine, B., Cantor-Graae, E. & Bajunirwe, F. (2005). Psychological distress among AIDS orphans in rural Uganda. *Social Science and Medicine*, 61(3), 555–564.

Bauman, L., Foster, G., Johnson Silver, E., Berman, R., Gamble, I. & Muchaneta, L. (2006). Children caring for their ill parents with HIV/AIDS. *Vulnerable Children and Youth Studies*, 1(1), 56.

Bauman, L., Silver, E., Draimin, B. & Hudis, J. (2007). Children of mothers with HIV/AIDS: Unmet needs for mental health services. *Pediatrics*, 120(5), 1141–1147.

Bekker, L.G. (2015). Building our youth for the future. *Journal of the International AIDS Society*, 18(1), 1–7.

Betancourt, T.S., Meyers-Ohki, S., Stulac, S.N., Elizabeth Barrera, A., Mushashi, C. & Beardslee, W.R. (2011). Nothing can defeat combined hands (*Abashize hamwe ntakibananira*): Protective processes and resilience in Rwandan children and families affected by HIV/AIDS. *Social Science and Medicine*, 73(5), 693–701.

Bhana, A., Mellins, C.A., Petersen, I., Alicea, S., Myeza, N., Holst, H., … McKay, M. (2014). The VUKA family program: Piloting a family-based psychosocial intervention to promote health and mental health among HIV infected early adolescents in South Africa. *AIDS Care*, 26(1), 1–11.

Birdthistle, I., Floyd, S., Machingura, A., Mudziwapasi, N., Gregson, S. & Glynn, J. (2008). From affected to infected? Orphanhood and HIV risk among female adolescents in urban Zimbabwe. *AIDS*, 22, 759–766.

Booysen, F. (2002). Financial responses of households in the Free State province to HIV/AIDS-related morbidity and mortality. *South African Journal of Economics*, 70(7), 1193–1215.

Booysen, F. (2004). Income and poverty dynamics in HIV/AIDS-affected households in the Free State province of South Africa. *South African Journal of Economics*, 72(3), 522–545.

Brandt, R. (2007). Does HIV matter when you are poor and how? The impact of HIV/AIDS on the psychological adjustment of South African mothers in the era of HAART. Unpublished PhD dissertation, University of Cape Town.

Brown, L., Thurman, T., Rice, J., Boris, N., Ntaganira, J., Nyirazinyoye, L., … Snider, L. (2009). Impact of a mentoring program on psychosocial wellbeing of youth in Rwanda: Results of a quasi-experimental study. *Vulnerable Children and Youth Studies*, 4(4), 288–299.

Campbell, P., Handa, S., Moroni, M., Odongo, S. & Palermo, T. (2008). *A Situation Analysis of Orphans in 11 Eastern and Southern African Countries*. Retrieved from Nairobi: UNICEF ESARO.

Case, A. & Ardington, C. (2005). *The Impact of Parental Death on School Enrolment and Achievement: Longitudinal Evidence from South Africa*. CSSR Working Paper No. 97. Centre for Social Science Research, University of Cape Town.

Cluver, L. (2011). Children of the AIDS pandemic. *Nature*, 474, 27–29.

Cluver, L., Gardner, F. & Operario, D. (2007). Psychological distress amongst AIDS-orphaned children in urban South Africa. *Journal of Child Psychology and Psychiatry*, 48(8), 755–763.

Cluver, L., Hodes, R.J., Toska, E., Kidia, K.K., Orkin, F.M., Sherr, L. & Meinck, F. (2015). 'HIV is like a tsotsi. ARVs are your guns': Associations between HIV-disclosure and adherence to antiretroviral treatment among adolescents in South Africa. *AIDS*, 29(Suppl.1), S57–65.

Cluver, L., Meinck, F., Shenderovich, Y., Ward, C.L., Romero, R.H., Redfern, A., … Lechowicz, M. (2016). A parenting programme to prevent abuse of adolescents in South Africa: Study protocol for a randomised controlled trial. *Trials*, 17(1), 328.

Cluver, L. & Operario, D. (2008). Review: Intergenerational linkages of AIDS: Vulnerability of orphaned children for HIV infection. *Institute of Development Studies Bulletin*, 39(5), 28–35.

Cluver, L., Orkin, M., Boyes, M., Gardner, F. & Meinck, F. (2011). Transactional sex amongst AIDS-orphaned and AIDS-affected adolescents predicted by abuse and extreme poverty. *Journal of Acquired Immune Deficiency Syndromes*, 58(3), 336–343.

Cluver, L., Orkin, M., Gardner, F. & Boyes, M. (2011). Persisting mental health problems among AIDS-orphaned children in South Africa. *Journal of Child Psychology and Psychiatry*, 53(4), 363–370.

Cluver, L., Orkin, M., Kuo, C., Moshabela, M. & Kganakga, M. (2011). Infectious disease and TB co-occurrence amongst children with AIDS-affected caregivers. Paper presented at the South African AIDS Conference V, Durban.

Cluver, L., Orkin, F.M., Meinck, F., Boyes, M.E., & Sherr, L. (2016). Structural drivers and social protection: Mechanisms of HIV risk and HIV prevention for South African adolescents. *Journal of International AIDS Society*, 19(1), 20646.

Cluver, L., Orkin, M. F., Yakubovich, A.R. & Sherr, L. (2016). Combination social protection for reducing HIV-risk behavior amongst adolescents in South Africa. *Journal of Acquired Immune Deficiency Syndrome*, 28 (Suppl. 2), 73–82.

Cluver, L., Toska, E., Orkin, F. M., Meinck, F., Hodes, R., Yakubovich, A. R. & Sherr, L. (2016). Achieving equity in HIV-treatment outcomes: Can social protection improve adolescent ART-adherence in South Africa? *AIDS Care*, 28(Suppl. 2), 73–82.

Deacon, H. & Stephney, I. (2007). *HIV/AIDS, Stigma and Children: A Literature Review*. Retrieved from: http://www.hsrc.ac.za/en/research-outputs/view/3040

Duflo, E., Dupas, P. & Kremer, M. (2015). Education, HIV and early fertility: Experimental evidence from Kenya. *American Economic Review*, 105(9), 2257–2297.

Dunkle, K., Jewkes, R., Brown, H., Gray, G., McIntryre, J. & Harlow, S. (2004). Transactional sex among women in Soweto, South Africa: Prevalence, risk factors and association with HIV infection. *Social Science and Medicine*, 59(8), 1581–1592.

Dunkle, K., Jewkes, R., Nduna, M., Jama, N., Levin, J., Sikweyiya, Y. & Koss, M. (2007). Transactional sex with casual and main partners among young South African men in the rural Eastern Cape: Prevalence, predictors, and associations with gender-based violence. *Social Science and Medicine*, 65(6), 1235–1248.

Evans, J. & Becker, S. (2010). *Children Caring for Parents with HIV and AIDS: Global Issues and Policy Responses*. Bristol: Policy Press.

Fang, X., Li, X., Stanton, B., Hong, Y., Zhang, L., Zhao, G., … Lin, D. (2009). Parental HIV/AIDS and psychosocial adjustment among rural Chinese children. *Journal of Pediatric Psychology*, 34(10), 1053–1062.

Forehand, R., Jones, D., Kotchick, B., Armistead, L., Morse, E., Simon Morse, P. & Stock, M. (2002). Noninfected children of HIV-infected mothers: A 4-year longitudinal study of child psychosocial adjustment and parenting. *Behavior Therapy*, 33, 579–600.

Graff Zivin, J., Thirumurthy, H. & Goldstein, M. (2009). AIDS treatment and intrahousehold resource allocation: Children's nutrition and schooling in Kenya. *Journal of Public Economics*, 93, 1008–1015.

Gray, G.E., Van Niekerk, R., Struthers, H., Violari, A., Martinson, N., McIntyre, J. & Naidu, V. (2006). The effects of adult morbidity and mortality on household welfare and the well-being of children in Soweto. *Vulnerable Children and Youth Studies*, 1(1), 15.

Gregson, S., Nyamukapa, C., Garnett, G., Wambe, M., Lewis, J. & Mason, P. (2005). HIV infection and reproductive health in teenage women orphaned and made vulnerable by AIDS in Zimbabwe. *AIDS Care*, 17(7), 785–794.

Grimwood, A., Fatti, G., Mothibi, E., Malahlela, M., Shea, J. & Eley, B. (2012). Community adherence support improves programme retention in children on antiretroviral treatment: A multicentre cohort study in South Africa. *Journal of the International AIDS Society*, 15(2), 17381.

Handa, S., Halpern, C.T., Pettifor, A. & Thirumurthy, H. (2014). The government of Kenya's cash transfer program reduces the risk of sexual debut among young people age 15–25. *PLOS ONE*, 9(1), e85473.

Heise, L., Lutz, B., Ranganathan, M. & Watts, C. (2013). Cash transfers for HIV prevention: Considering their potential. *Journal of the International AIDS Society*, 16, 18615.

Joint United Nations Programme on HIV/AIDS (UNAIDS). (2015a). *2015 HIV and AIDS Estimates*. Retrieved from: http://www.unaids.org/en/regionscountries/countries/southafrica

Joint United Nations Programme on HIV/AIDS (UNAIDS). (2015b). *UNAIDS 2014 HIV and AIDS Estimates, in Key Regional Charts and Figures: Eastern and Southern Africa. 2015*. Retrieved from: https://data.unicef.org/topic/hivaids/global-regional-trends/

Joint United Nations Programme on HIV/AIDS (UNAIDS), United Nations Children's Fund (UNICEF) & World Health Organization (WHO). (2013). *2013 Global AIDS Response Progress Reporting*. Retrieved from: http://files.unaids.org/en/media/unaids/contentassets/documents/document/2013/GARPR_2013_guidelines_en.pdf

Kaljee, L., Zhang, L., Langhaug, L., Munjile, K., Tembo, S., Menon, A., … Malungo, J. (2016). A randomized-control trial for the teachers' diploma programme on psychosocial care, support and protection in Zambian government primary schools. *Psychology, Health and Medicine*, 1–12.

Kumakech, E., Cantor-Graae, E. & Maling, S. (2009). Peer-group support intervention improves the psychosocial well-being of AIDS orphans: Cluster randomized trial. *Social Science and Medicine*, 68(6), 1038–1043.

Kuo, C., Reddy, M.K., Operario, D., Cluver, L. & Stein, D.J. (2013). Post-traumatic stress symptoms among adults caring for orphaned children in HIV-endemic South Africa. *AIDS and Behavior*, 17(5), 1755–1763.

Lachman, J.M., Cluver, L.D., Boyes, M.E., Kuo, C. & Casale, M. (2014). Positive parenting for positive parents: HIV/AIDS, poverty, caregiver depression, child behavior, and parenting in South Africa. *AIDS Care*, 26(3), 304–313.

Lindblade, K., Odhiambo, F., Rosen, D. & DeCock, K. (2003). Health and nutritional status of orphans <6 years old cared for by relatives in western Kenya. *Tropical Medicine & International Health*, 8(1), 67–72.

Lowenthal, E., Lawler, K., Harari, N., Moamogwe, L., Masunge, J., Masedi, M., … Gross, R. (2012). Rapid psychosocial function screening test identified treatment failure in HIV+ African youth. *AIDS Care*, 24(6), 722–727.

Makame, V., Ani, C. & McGregor, S. (2002). Psychological well-being of orphans in Dar el-Salaam, Tanzania. *Acta Paediatrica*, 91, 459–465.

Meinck, F., Cluver, L.D. & Boyes, M.E. (2015). Household illness, poverty and physical and emotional child abuse victimisation: Findings from South Africa's first prospective cohort study. *BMC Public Health*, 15, 444.

Meinck, F., Cluver, L.D., Boyes, M.E. & Loening-Voysey, H. (2016). Physical, emotional and sexual adolescent abuse victimisation in South Africa: Prevalence, incidence, perpetrators and locations. *Journal of Epidemiology and Community Health*, 70, 1–7.

Meinck, F., Cluver, L.D., Boyes, M.E. & Mhlongo, E.L. (2015). Risk and protective factors for physical and sexual abuse of children and adolescents in Africa: A review and implications for practice. *Trauma Violence Abuse*, 16(1), 81–107.

Mellins, C., Brackis-Cott, E., Abrams, E. & Dolezal, C. (2006). Rates of psychiatric disorder in perinatally HIV-infected youth. *Pediatric Infectious Disease Journal*, 25, 432–437.

Mellins, C., Elkington, K., Bauermeister, J., Brackis-Cott, E., Dolezal, K., McKay, M., … Abrams, E. (2009). Sexual and drug use behavior in perinatally HIV-infected youth: Mental health and family influences. *Journal of the American Academy of Child and Adolescent Psychiatry*, 48(8), 810–819.

Mellins, C., Smith, R., O'Driscoll, P., Magder, L., Brouwers, P., Chase, C., … Matzen, E. (2007). High rates of behavioral problems in perinatally HIV-infected children are not linked to HIV disease. *Pediatrics*, 111, 384–393.

Mellins, C.A., Tassiopoulos, K., Malee, K., Moscicki, A.B., Patton, D., Smith, R., … Pediatric, H.I.V. A.C.S. (2011). Behavioral health risks in perinatally HIV-exposed youth: Co-occurrence of sexual and drug use behavior, mental health problems, and nonadherence to antiretroviral treatment. *AIDS Patient Care STDS*, 25(7), 413–422.

Mishra, V., Arnold, F., Otieno, F., Cross, A. & Hong, R. (2005). *Education and Nutritional Status of Orphans and Children of HIV-Infected Parents in Kenya*. USAID DHS Working Paper Series 2005, No. 4. Washington, DC: United States Agency for International Development (USAID) Demographic and Health Research.

Nachega, J.B., Hislop, M., Nguyen, H., Dowdy, D.W., Chaisson, R.E., Regensberg, L., … Maartens, G. (2009). Antiretroviral therapy adherence, virologic and immunologic

outcomes in adolescents compared with adults in southern Africa. *Journal of Acquired Immune Deficiency Syndromes*, 51(1), 65–71.

Nyamukapa, C., Gregson, S., Lopman, B., Saito, S., Watts, H., Monasch, R. & Jukes, M. (2008). HIV-associated orphanhood and children's psychosocial distress: Theoretical framework tested with data from Zimbabwe. *American Journal of Public Health*, 98(1), 133–141.

Oldewage-Theron, W.H. & Napier, C.E. (2011). Nutritional education tools for primary school children in the Vaal region. *Development in Southern Africa*, 28(2), 283–292.

Operario, D., Pettifor, A., Cluver, L., MacPhail, C. & Rees, H. (2008). Parental death during school-aged years and completion of compulsory school education among young people in South Africa. *Journal of Research on Adolescence*, 18(1), 173–186.

Orkin, M., Boyes, M.E., Cluver, L.D. & Zhang, Y. (2013). Pathways to poor educational outcomes for HIV/AIDS-affected youth in South Africa. *AIDS Care*, 26(3), 343–350.

Pettifor, A., Bekker, L.G., Hosek, S., DiClemente, R., Rosenberg, M., Bull, S.S., … Committee, H.I.V. P.T.N.A.S. (2013). Preventing HIV among young people: Research priorities for the future. *Journal of Acquired Immune Deficiency Syndromes*, 63(Suppl. 2), S155–160.

Power, R., Tate, H., McGill, S., & Taylor, C. (2003). A qualitative study of psychosocial implications of lipodystrophy syndrome on HIV positive individuals. *Sexually Transmitted Infections*, 79, 137–141.

Remme, M., Vassall, A., Lutz, B., Luna, J. & Watts, C. (2014). Financing structural interventions: Going beyond HIV-only value for money assessments. *AIDS,* 28(3), 425–434.

Richter, L.M., Foster, G. & Sherr, L. (2006). *Where the Heart Is: Meeting the Psychosocial Needs of Young Children in the Context of HIV/AIDS*. The Hague: Bernard van Leer Foundation.

Richter, L.M. & Sherr, L. (2009). Strengthening families: A key recommendation of the Joint Learning Initiative on Children and AIDS (JLICA). *AIDS Care,* 21(Suppl. 1), 1–2.

Robertson, L., Mushati, P., Eaton, J.W., Dumba, L., Mavise, G., Makoni, J., … Gregson, S. (2013). Effects of unconditional and conditional cash transfers on child health and development in Zimbabwe: A cluster-randomised trial. *The Lancet*, 381(9874), 1283–1292.

Robson, E. (2000). Invisible carers: Young people in Zimbabwe's home-based healthcare. *Area*, 32(1), 59–69.

Rochat, T., Bland, R., Coovadia, H., Stein, A. & Newell, M. (2011). Towards a family-centred approach to HIV treatment and care for HIV-exposed children, their mothers and their families in poorly resourced settings. *Future Virology*, 6(6), 687–696.

Rochat, T., Mitchell, C. & Richter, L.M. (2008). *The Psychological, Social and Developmental Needs of Babies and Young Children and their Caregivers Living with HIV/AIDS*. Pretoria: UNICEF and the Department of Health.

Rochat, T., Mkwanazi, N. & Bland, R. (2013). Maternal HIV disclosure to HIV-uninfected children in rural South Africa: A pilot study of a family-based intervention. *BMC Public Health*, 13, 147.

Rochat, T., Richter, L., Doll, H., Buthelezi, N., Tomkins, A. & Stein, A. (2006). Depression among pregnant rural South African women undergoing HIV testing. *Journal of the American Medical Association*, 295(12), 1376–1378.

Rotheram-Borus, M.-J., Lightfoot, M. & Shen, H. (1999). Levels of emotional distress among parents living with AIDS and their adolescent children. *AIDS and Behavior*, 3(4), 367–372.

Sarker, M., Neckermann, C. & Muller, O. (2005). Assessing the health status of young AIDS and other orphans in Kampala, Uganda. *Tropical Medicine & International Health*, 10(3), 210–215.
Sherr, L. (2005). *Young Children and HIV/AIDS: Mapping the Field*. Working Papers in Early Child Development No. 33. Young Children & HIV/AIDS Sub-series. The Hague: Bernard van Leer Foundation.

Sherr, L., Croome, N., Parra Castaneda, K. & Bradshaw, K. (2014). A systematic review of psychological functioning of children exposed to HIV: Using evidence to plan for tomorrow's HIV Needs. *AIDS and Behavior*, 18(11), 2059–2074.

Sherr, L., Croome, N., Parra Castaneda, K., Bradshaw, K. & Herrero Romero, R. (2014). Developmental challenges in HIV infected children—An updated systematic review. *Children and Youth Services Review,* 45, 74–89.

Sherr, L., Yakubovich, A.R., Skeen, S., Cluver, L.D., Hensels, I.S., Macedo, A. & Tomlinson, M. (2016). How effective is help on the doorstep? A longitudinal evaluation of community-based organisation support. *PLOS ONE*, 11(3), e0151305.

Skeen, S., Tomlinson, M., Croome, N. & Sherr, L. (2014). *Interventions for Improving the Psychosocial Well-being of Children Affected by HIV and AIDS: A Systematic Review*. Report for RIATT-ESA.

Skovdal, M. (2010). Community relations and child-led microfinance: A case study of caregiving children in Kenya. *AIDS Care*, 22 Suppl 2, 1652–1661.

Skovdal, M. (2011). Picturing the coping strategies of caregiving children in Western Kenya: From images to action. *American Journal of Public Health*, 101(3), 452–453.

Skovdal, M., Ogutu, V. O., Aoro, C. & Campbell, C. (2010). Young carers as social actors: Coping strategies of children caring for ailing or ageing guardians in western Kenya. *Social Science and Medicine*. 69(4), 587–595.

Stein, A., Krebs, G., Richter, L., Tomkins, A., Rochat, T. & Bennish, M. (2005). Babies of a pandemic: Infant development and HIV. *Archives of the Diseases of Childhood*, 90, 116–118.

Stein, A., Ramchandani, P. & Murray, L. (2008). Impact of parental psychiatric disorder or physical illness. In: M. Rutter, D. Bishop, D. Pine, S. Scott, J.S. Stevenson, E. Taylor & A. Thapar (eds). *Rutter's Child and Adolescent Psychiatry*, 5th edn. London: Wiley-Blackwell, pp. 409–422.

Taaffe, J., Cheikh, N. & Wilson, D. (2016). The use of cash transfers for HIV prevention--are we there yet? *African Journal of AIDS Research*, 15(1), 17–25.

Thurman, T., Brown, L., Richter, L., Maharaj, P. & Magnani, R. (2006). Sexual Risk Behavior among South African adolescents: Is orphan status a factor? *AIDS and Behavior*, 10(6), 627–635.

Thurman, T. & Kidman, R. (2011). *Chronic Illness in the Home: Implications for Children in KwaZulu-Natal, South Africa*. USAID and Tulane University School of Public Health and Tropical Medicine.

Tomlinson, M. (2010). Family-centred HIV interventions: Lessons from the field of parental depression. *Journal of the International AIDS Society*, 13 (S2*)*, S9.

Tomlinson, M., Doherty, T., Ijumba, P., Jackson, D., Lawn, J., Persson, L.A., … Chopra, M. (2014). Goodstart: A cluster randomised effectiveness trial of an integrated, community-based package for maternal and newborn care, with prevention of mother-to-child transmission of HIV in a South African township. *Tropical Medicine and International Health*, 19(3), 256–266.

Toska, E., Cluver, L.D., Boyes, ME., Isaacsohn, M., Hodes, R. & Sherr, L. (2016). School, supervision and adolescent-sensitive clinic care: Combination social protection and reduced unprotected sex among HIV-positive adolescents in South Africa. *AIDS and Behavior*. doi:10.1007/s10461-016-1539-y

Joint United Nations Programme on HIV/AIDS (UNAIDS). (2015a). *2015 HIV and AIDS Estimates*. Retrieved from: http://www.unaids.org/en/regionscountries/countries/southafrica

Joint United Nations Programme on HIV/AIDS (UNAIDS). (2015b). *UNAIDS 2014 HIV and AIDS Estimates, in Key Regional Charts and Figures: Eastern and Southern Africa. 2015*. Retrieved from: https://data.unicef.org/topic/hivaids/global-regional-trends/

Joint United Nations Programme on HIV/AIDS (UNAIDS), United Nations Children's Fund (UNICEF) & World Health Organization (WHO). (2013). *2013 Global AIDS Response Progress Reporting*. Retrieved from: http://files.unaids.org/en/media/unaids/contentassets/documents/document/2013/GARPR_2013_guidelines_en.pdf

United Nations Children's Fund (UNICEF). (2013). *Towards an AIDS-free Generation – Children and AIDS: Sixth Stocktaking Report*. Retrieved from: https://www.unicef.org/publications/files/Children_and_AIDS_Sixth_Stocktaking_Report-Summary.pdf

Ward, C., Mikton, C., Cluver, L., Cooper, C., Gardner, F., Hutchings, J., … Wessels, I. (2015). Parenting for lifelong health: From South Africa to other low-and middle-income countries. *Early Childhood Matters*, 122, 49–54.

Watts, H., Gregson, S., Saito, S., Lopman, B., Beasley, M. & Monasch, R. (2007). Poorer health and nutritional outcomes in orphans and vulnerable young children not explained by greater exposure to extreme poverty in Zimbabwe. *Tropical Medicine and International Health*, 12(5), 584–593.

Woollett, N., Cluver, L., Hatcher, A. & Brahmbhatt, H. (2016). 'To be HIV positive is not the end of the world': Resilience among perinatally infected HIV-positive adolescents in Johannesburg. *Children and Youth Services Review*, 70, 269–275.

Chapter 7

Birth to Twenty Plus: Early health and development from a longitudinal perspective

Linda M. Richter, Sara N. Naicker & Shane A. Norris

Infant and child health and development in South Africa

Although studies of infants and young children in South Africa date back to the start of the twentieth century,[1] for more than four decades they were largely limited to racially based comparisons between black and white children.[2] When differences were found, the inferiority of Africans tended to be attributed to genetic endowment or 'poor stock'. This perspective helped to justify the South African policy of separate development of black and white people, and had a profound influence on the development of the infamous Bantu Education System. The education policy aimed to limit what black children could and should learn in school, in line with the constraints placed on their employment prospects by the apartheid regime.

In sharp contrast, evidence advanced by behavioural and social scientists in the Carnegie Commission Investigation on the Poor White Question in South Africa (1932), argued that the circumstances of so-called 'poor whites' could be explained by environmental factors, most especially poor nutrition and the lack of education.[3] As a result of these findings, compensatory schemes, including job protection, improved access to education and school feeding, were implemented to boost the socio-economic circumstances of poor white people.[4]

The tension between what is assumed to be due to history, either biological or social, and the modifiability of both genes and environment through intervention, continues to raise fundamental questions for the study of child growth and development. In this chapter, we focus on what we have learnt from a long-term birth cohort study about three important environmental influences on children's health and development: nutrition, maternal mental health and the socio-economic conditions in which children and families live. By way of introduction, the influence

1 Andor, 1966.
2 Richter & Dawes, 2008, pp. 286–323.
3 Dubow, 1995.
4 Liddell & Kvalsig, 1990, pp. 1–9.

of all three is vividly illustrated by two robust findings about African children in southern Africa in their first two years of life.

African babies as a group show faster mental and motor development than other children during the first year of life.[5] This advantage levels off and starts to decline at around the same time that their growth trajectories tend to decline. Slow growth sometimes leads to stunting (shorter than expected length or height), followed by recovery between two and five years of age. What accounts for this rapid psychological development in the first year of life? The early environment of African children in traditional societies is thought to be optimal, with high levels of responsive breastfeeding, co-sleeping, upright carriage in a sling cloth on the mother's back or side, closeness to the mother's body, maternal responsiveness to infant signals as a result of close physical proximity, and rich and varied social engagement within affectionate and secure extended families.[6] These social and psychological conditions are thought to promote the motor and mental development of African infants.

In contrast, the linear growth of the same children often falters with the transition from breastfeeding to complementary foods, as well as increased infections associated with infant mobility and exposure to unsafe drinking water, domestic animals and other potentially infectious conditions. In addition, towards the end of the first year of life, children are often given considerable leeway with respect to self-feeding, and may not consume enough food as regularly as they need.[7] Nonetheless, African children often make a marked recovery in growth by three to four years of age, though still falling short of international growth standards.[8] As the above example demonstrates, social, cultural and economic conditions, together with nutrition and parental behaviour, all significantly affect growth and development in early childhood. Birth to Twenty Plus (Bt20+), a long-term prospective birth cohort study to age 27, allows us to examine, among other topics, the influences of social and economic conditions, nutrition and parenting on the growth and development of children and adolescents.

The value of a life-course approach and longitudinal perspectives

Influences on children's growth and development have been demonstrated to operate across generations,[9] affected by the past and, in turn, shaping the future. Observations of children's growth and development, or of family functioning, made

5 Warren, 1972, p. 353.
6 Geber, 1958; Goldberg, 1972, pp. 77–89; Tomlinson et al., 2005, pp. 1044–1054.
7 Mamabolo et al., 2004, pp. 327–333.
8 Norris et al., 2009, pp. 21–27; Shrimpton et al., 2001, p. 75.
9 Najman et al., 2004, pp. 1147–1158; Stein et al., 2003, pp. 162–167.

at a single point in time in cross-sectional studies can lose the perspective of changes occurring across time due to both developmental processes and changing conditions. Moreover, outcomes measured prospectively, before hypothesised exposures occur or are experienced, strengthen the possibility of causal inference.[10]

One of the earliest long-term studies of children's development, and now the longest-running developmental study in the world, is Lewis Terman's follow-up of 1 500 British child 'geniuses' born in the early 1900s.[11] Terman found that gifted children were not the social misfits they were stereotyped to be, but generally grew up to be taller, healthier, better adjusted than other children, and more successful. He believed that those 'Termites' (as they came to be known) who did not reach their full potential had not been given sufficient opportunity, laying the foundation for schools and special classes for exceptional children.

Another example of a long-term study is Glen Elder's follow-up of Californian children in two cohorts, born in the 1920s and later, who lived through the Great Depression in the United States.[12] One group experienced economic turmoil in adolescence, after a secure beginning, while the other endured severe hardships when they were younger and more vulnerable. This showed the importance of timing and how the impact of the same events was contingent on when they occurred in a child's life.

Longitudinal studies also have distinct technical advantages. It is not always possible in a cross-sectional study to know very much about the people who were not recruited into the study. The 'missing' people often have characteristics related to vulnerability and adversity, the very things we frequently want to study. As an illustration, if we investigate drug use among secondary school students, we miss those young people who drop out of school earlier than our study, a group known to be at higher risk for drug use than those youths who stay in school. In longitudinal studies it is usually possible to know who is missing at any time point, at least some of their characteristics, and the degree to which their absence may bias the study's observations.

There are, though, also distinct disadvantages to longitudinal studies. Michael Rutter quotes James Baldwin, stating that a longitudinal study 'is an absolutely essential research method if we are to get firm knowledge of psychological change, but paradoxically, it should be avoided wherever possible'.[13] The reasons for Baldwin's caution are that longitudinal studies are expensive and time-consuming and should be used only when the questions posed cannot be answered in a cross-sectional

10 Raudenbush, 2001, pp. 501–525.
11 Holahan & Sears, 1995.
12 Elder, 1999.
13 Rutter, 1994, p. 928.

design and their answers depend on temporal or lifecycle information. In addition, changes in methods and concepts can make it difficult to link information collected over very long periods. Further, as time goes by, people leave the study for reasons ranging from disinterest to relocation and death, and this attrition can affect the comparability of the initial and final samples.

There are several types of longitudinal studies. Retrospective studies involve looking into the past of a group of individuals with some shared characteristics by examining, say, their medical records or school reports. In panel studies, a cross-section of individuals are recruited and followed up at specified intervals for a particular length of time. Lastly, cohort studies involve selecting a group based on a particular common characteristic and following them up over time. A birth cohort study involves recruiting a group of individuals who are born within the same time period and, usually, in the same location.

Birth to Twenty Plus (Bt20+) is a birth cohort study which recruited all singleton children born in the geographically demarcated area of Soweto and Johannesburg, South Africa, between April and June 1990, provided their mothers remained resident in the area for at least six months after delivery.[14] Bt20+ participants and their families were interviewed 23 times, starting during their mother's pregnancy until the age of 27 years. During this time we collected a wide range of data, including family health histories, socio-economic status, parent and child mental health, school results, growth and physiological parameters.[15] We have started to collect new information from the third generation, the children of Birth to Twenty children (called 3G). Over the course of the study, attrition has been 30 per cent, with the major loss of participants in their early years of life, when mothers returned to rural areas with their young children or sent them to rural areas while they continued to work in the city.[16]

When Bt20+ started in 1989, the first signs of epidemiological, demographic and nutritional transition in South Africa were discernible, occurring alongside the immense political and social transitions that were taking place. Fertility and under-five mortality rates among urban black South Africans were declining, as were preventable childhood infectious diseases. At the same time, chronic infections such as HIV and tuberculosis were on the rise, as were chronic illnesses associated with changes in lifestyle and high levels of urban stress. Social problems specifically affecting children were also increasing; among others, neglect and abuse of children because of fragmented families and communities and the lack of affordable childcare for working mothers.[17]

14 Yach et al., 1990, p. 325.
15 Richter et al., 2007, pp. 504–511.
16 Norris et al., 2007, pp. 1143–1150; Richter et al., 2009, pp. 319–334.
17 Yach et al., 1990, p. 325.

Birth to Ten (which became Birth to Twenty and is now Birth to Twenty Plus) started in 1989 with pilot studies to determine the feasibility of a long-term birth cohort project.[18] The following year, 1990, women living in Johannesburg–Soweto were recruited through public health services during pregnancy, delivery and the first year of their child's life. Of the 5 449 singleton births that took place during a seven-week period between April and June 1990, only 3 273 mothers and babies were still resident in the area by the time the children were six months old.[19] This reduction of approximately 30–40 per cent of births was predicted by pilot work, which established that large numbers of women in rural areas, married to urban migrant men, came to Johannesburg–Soweto to have their babies and then returned home. Their reasons included having their child endorsed as an urban resident so that the child could work in urban areas as an adult in terms of apartheid legislation, wanting the father to recognise and support the baby, and preferring to deliver in a tertiary hospital than a rural clinic.[20]

The study was extended to Birth to Twenty in 2000. In the third phase, Birth to Twenty Plus, the cohort has begun to have its own children, more than 800 of whom have already been enrolled into a multi-generational study of foetal maturation, and growth and development.

Early determinants of adult health and human capital

It is clear from many studies throughout the world that children in societies that are poor, with inadequate nutrition and insufficient health care, are smaller than those who grow up in societies that are financially secure and have adequate nutrition and good health. These disadvantages persist into adolescence and adulthood with consequences for education, productivity, health and longevity.[21] For example, undernutrition in the preschool years is associated, in low- and middle-income countries (LMICs), with an average loss of one to two grades of schooling[22] and 26 per cent of average annual income.[23] The potential that we inherit from our parents can only be fully realised in a conducive and enabling environment, with conditions that nurture physical, mental and social development. It is not surprising, therefore, that as environmental conditions improve, children grow taller, they are more robust, learn more quickly and mature earlier.

Recently, theory and evidence has converged on the mechanisms by which biological and environmental factors in early life affect physiological and psychological

18 Fonn et al., 1991, pp. 449–454.
19 Richter et al., 2004, pp. 290–301; Richter et al., 1995, pp. 109–120.
20 Fonn et al., 1991, pp. 449–454.
21 Black et al., 2008, pp. 243–260.
22 Grantham-McGregor et al., 2007, pp. 60–70.
23 Richter et al., 2017, pp. 103–118.

mechanisms in ways that result in latent vulnerabilities. These vulnerabilities, together with adversities and adjustments occurring through critical development periods, and even between generations, lead to long-term risk of poor health, low achievement and impaired adjustment. For example, poor maternal nutrition (including obesity), depression and exposure to teratogens during pregnancy, together with undernutrition, neglect and/or exposure to violence in infancy, cause toxic stress. Toxic stress is strong, frequent or prolonged activation of the body's stress response system in the absence of ameliorating factors.[24] It is harmful to foetal and infant development and, together with persistent adversity, sets in motion adaptations that have a high likelihood of resulting in later personal problems, social maladjustment and disease.

While it is well accepted that both genes and environment determine physical and psychological development, the extent to which early exposures and experiences affect phenotypic expression with potentially lifelong consequences have only recently become evident. These early, often irreversible, influences occur through two main processes. The first is through distorted morphology or the impaired development of a biological structure. The second is through metabolic programming, or the physiological setting or calibration of a biological mechanism or response at some critical time in development.[25]

Distorted morphology commonly underlies prenatal and perinatal disability, and using research from the follow up of people born during famine, it is believed to be at least one of the causes of schizophrenia, resulting from acute undernutrition during pregnancy. A two-fold increase in schizophrenia was found among adults who were mid-gestation at the time of the 1944 Dutch famine,[26] and a similarly high risk was found among adults whose mothers were pregnant during the 1958–1961 Chinese famine.[27]

With respect to programming, the *developmental origins of health and disease hypothesis* suggests that genetic directives get activated or deactivated by conditions prevailing during foetal and early postnatal development. For example, size at birth reflects the growth trajectory which was set at an early stage in development by maternal-placental capacity to supply sufficient nutrients, on the one hand, and foetal capacity to take up nutrients, on the other. Similarly, high levels of stress or instability during foetal and early post-natal development can result in permanent changes in the stress response system, leading to permanently high activation, which

24 Shonkoff et al., 2009, pp. 2252–2259.
25 Ulijaszek & Henry, 1996, p. 253.
26 Hulshoff Pol et al., 2000, pp. 1170–1172.
27 St Clair et al., 2005, pp. 557–562.

is damaging to physiological, social and psychological processes.[28]

Failure to meet foetal nutrient and other environmental requirements results in a range of adaptations and developmental changes. While these adaptations are meant to maximise short-term survival, they may lead to permanent alterations in structure and metabolism, which, in concert with either existing or changing behavioural and environmental conditions, can result in disease and disorder in later life. Similarly, poor nutrition and environmental factors during infancy can further exacerbate the risk for later disease.

One of the best-known examples of this early programming is that of the 'Barker hypothesis', or 'the thrifty phenotype'. Barker and colleagues traced 16 000 men and women born in Hertfordshire, England, between 1911 and 1930 and found that surviving adults born at low birth weight were twice as likely to suffer from coronary heart disease compared to those born at normal birth weight.[29] The thrifty phenotype hypothesis holds that early life metabolic adaptations occur in response to environmental conditions during foetal development. In response to food scarcity, for example, the individual inclines to smaller body size, a lower metabolic rate and a reduced level of behavioural activity. Over time, especially if the individual grows up with plentiful or high carbohydrate foods, these adaptations create a mismatch with the environment and lead to a range of conditions associated with the 'metabolic syndrome', including obesity, high blood pressure and diabetes.

In the light of this, a life-course approach is necessary to understand health and well-being, combining studies of biological, behavioural and psychosocial pathways that operate across an individual's life, as well as across generations. In the sections that follow, we provide three examples of a life-course approach and findings from the Birth to Twenty Plus study with respect to early nutrition, maternal mental health, and the impact of early social and economic environments.

Early nutrition and growth (Example 1)

In this section, we review Bt20+ data on birth weight and subsequent growth, changes in nutrition and risk for obesity and metabolic disease.

Birth weight and subsequent growth

Richardson (1978) reviewed over 14 000 South African children's growth data and showed that rural black children had the shortest stature and lowest weight, while white urban children were the tallest and heaviest.[30] Furthermore, he demonstrated

28 Evans & Kim, 2007, pp. 953–957; Lupien et al., 2000, pp. 976–980.
29 Barker & Osmond, 1986, pp. 1077–1081.
30 Richardson, 1978, pp. 246–249.

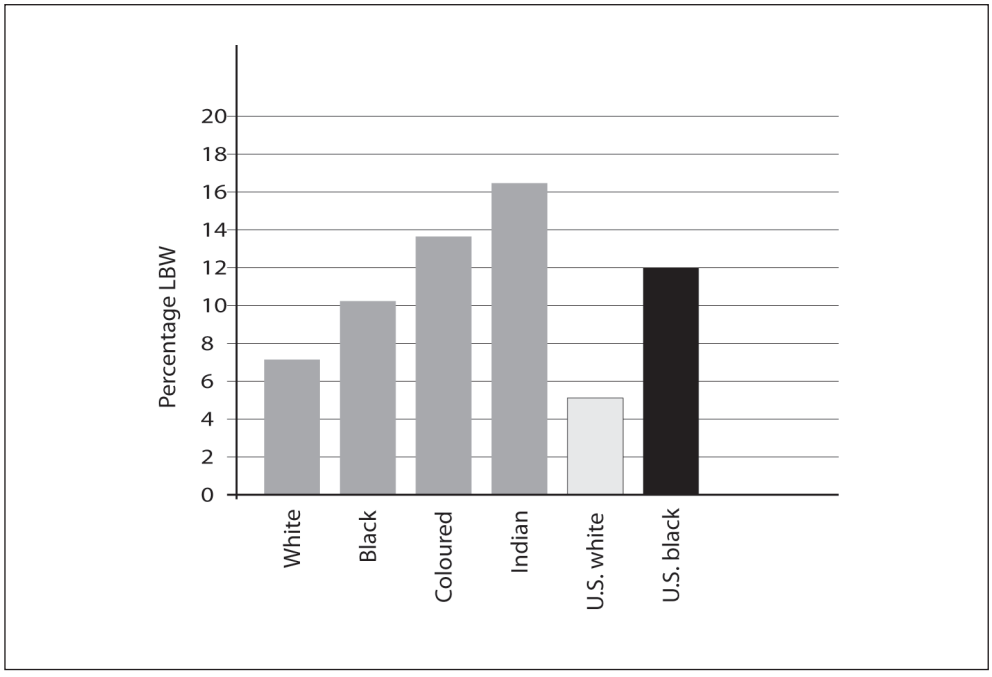

Figure 7.1: Percentage LBW among the Bt20+ sample in comparison to whites and African-Americans in the USA[31]

Source: Richter et al., 2004, pp. 290–301

that there was a steady gradient in linear growth along the socio-economic continuum. In 1990 in the Bt20+ cohort, white children were born significantly heavier (a mean of 3 223 grams), followed by black (3 079 grams), coloured (3 023 grams) and Indian children (2 895 grams).

Figure 7.1 shows the percentage of low birth weight (LBW) infants in Bt20+ in comparison to white and African-American children in the United States in 1990, the year in which the South African cohort was born. African-Americans also have a relatively high percentage of LBW infants, at a similar rate to that of black and coloured children in Soweto. The important and critical difference is that following birth, African-American children grow rapidly in response to a relatively good environment to achieve greater heights and weights than black South African children. In South Africa, white children characteristically have the lowest rate of LBW, followed by black, coloured and Indian children. This is because LBW follows gradations in maternal size and socio-economic status, with Indian women being smaller than other women in South Africa.

31 Richter et al., 2004, pp. 290–301.

Over their first decade of life, white children in Bt20+, with the highest birth weights, maintain their relative growth advantage. Indeed, by the end of the first year, the growth patterns of the groups clearly diverge and white children remain the tallest and heaviest throughout childhood. These differences persist despite an overall positive trend in children's growth in South Africa associated with overall nutritional improvement. For example, between 1970 and 1990, black girls grew taller by approximately five to 10 centimetres, or four to five centimetres per decade.

Stunting

Children born small in LMICs, such as South Africa, are at greater risk of infant stunting. Stunting, which is defined as a z-score of height-for-age against World Health Organization (WHO) standards of less than –2, is a consequence of LBW and persistent poor health and nutrition during infancy. When children remain in the same disadvantageous environment, early poor growth is not usually made up as they get older and stunted children are shorter as adults. Using the WHO growth standards, we found that, by-and-large, the mean standard deviation scores increased in the first six months of life and then progressively declined with the introduction of complementary foods, with a high rate of stunting—over 20 per cent—by age two years.[32] This pattern seems universal in LMICs. Victora and colleagues (2010) analysed information available from the WHO Global Database on Child Growth and Malnutrition, from 54 countries, and found that length for age starts close to the standard but falters significantly until two years of age.[33]

The impact of growth faltering and being stunted by age two years is profound. In 2006, Bt20+ joined the Consortium of Health Oriented Research in Transitioning Societies (COHORTS), a network of the five largest and longest running birth cohort studies in the LMICs: South Africa, Brazil, Guatemala, New Delhi, and the Philippines. The first joint COHORTS analysis showed that across the five countries, maternal and child undernutrition at two years of age was significantly related to adult human capital (school years completed) and chronic disease outcomes (blood pressure and glucose concentrations). We concluded that damage suffered in early life leads to permanent impairment that might also affect future generations.[34] Furthermore, in subsequent COHORTS pooled analyses, growth failure in infancy, in comparison to later ages, was most strongly associated with adult stature.[35] The consistency across the LMICs emphasises the importance of both the long-term effects of early life growth faltering and the need for interventions to promote intrauterine and infant growth.

32 Norris et al., 2007, pp. 1143–1150.
33 Victora et al., 2010, pp. 473–480.
34 Victora et al., 2008, pp. 340–357.
35 Stein et al., 2010, pp. 353–359.

Changes in nutrition

Most countries are now affected by demographic, nutrition, and disease transitions, with increases in the metabolic syndrome, a cluster of the most dangerous heart attack risk factors: diabetes and prediabetes, abdominal obesity, high cholesterol, and high blood pressure. These conditions are becoming epidemic in LMICs.[36] The nutrition of children influences adult health,[37] and research has clearly shown that many components of the metabolic syndrome have their origins in childhood and/or adolescence.[38]

Together with the transition to a democracy in South Africa, a transition in dietary consumption and activity levels also occurred. This was principally a change from a traditional diet of low-fat, high-fibre foods to a Western diet of high-fat, low-fibre, high-energy foods driven largely by increased intake of convenient, already prepared meals. In addition, these transitions were accompanied by other behavioural shifts to a less active, more sedentary lifestyle. This brings a constellation of risk factors to the fore that is already evident among South African children.

Diet is part of the aetiology of the metabolic syndrome.[39] A key factor is the recognition that nutritional interventions at different stages of life are necessary if childhood nutrition is to improve. The Bt20+ study is the first longitudinal nutrition study in South Africa to provide information on changes in childhood and adolescent nutrition over time. From this, key nutrient deficiencies can be identified and we can identify individuals at risk for disease and, therefore, a target for interventions. This could help to prevent aspects of the metabolic syndrome being realised in adulthood.

Nutritional information has been collected at regular intervals in Bt20+, including the intake of 26 micronutrients. Calcium, iron, zinc and biotin were the most common nutrients that fell below the Recommended Dietary Allowances (RDA) at various age points, with the largest percentage of children falling below the RDAs for these nutrients. A striking finding was that the nutrient intake of children appeared to deteriorate from 1995 to 2000, with the lowest intakes for most nutrients recorded when children were 10 years old.[40] Poor micronutrient intake in childhood can have severe consequences for both growth and cognitive development.[41]

However, the scenario changed in adolescence. Tracking longitudinal dietary patterns, we found that poor eating habits are well established by the age of 13 years. Furthermore, these poor habits become entrenched with increasing age. Findings

36 Schutte et al., 2003, pp. 29–35.
37 Tomkins, 2001, pp. 93–99.
38 Keller & Lemberg, 2003, pp. 167–170; Schutte et al., 2003, pp. 29–35; Vanhala et al., 1999.
39 Barnard et al., 1998, pp. 1311–1315; Meigs, 2002, pp. 283–292; Pereira et al., 2002, pp. 848–855.
40 MacKeown et al., 2003, pp. 185–197.
41 Walker et al., 2011, pp. 1325–1338.

illustrate an increase in the number of snack items consumed as the cohort grew older (TV snacks, tuck-shop purchases, fast food and soft drinks), as well as a decline in both breakfast consumption and lunch-box usage at school. On average, eight fast-food items were consumed by adolescents over a week, with some participants consuming over 20 items per week.[42] Regular consumption of energy-dense, micronutrient-deficient foods poses health risks. Feeley et al. (2009) suggest that the poor dietary habits of these young people will set them up to overconsume energy-dense snacks, placing them at risk of obesity. Indeed, by 18 years of age, 28 per cent of female and 10 per cent of male Bt20+ participants were either overweight or obese. While poor dietary practices and habits fuel weight gain in later childhood, there is also a link to early life, which is discussed in the following section.[43]

Catch-up growth, obesity and type 2 (non-insulin dependent) diabetes

Catch-up growth is often defined by increased growth velocity in height or weight after the elimination of a constraint on normal growth. Ong et al. (2000) defined 'clinically significant catch-up growth' as a change of 0.67 z-scores in weight between birth and two years. Ong et al. demonstrated that British subjects' children who showed catch-up weight had a greater risk for being obese by five years of age and, in particular, greater central fat deposition.[44] Twenty per cent of the Bt20+ children demonstrated catch-up growth and these children were significantly taller and heavier by age nine years, and were more likely to be overweight/obese.[45]

Low weight at birth and subsequent rapid weight gain in South African children is not only associated with obesity. According to the Barker hypothesis, this combination of early life factors could make individuals more susceptible to type 2 diabetes in later life.[46] In Bt20+, we provided a group of children, who had fasted overnight, with a glucose drink and determined their blood glucose and insulin concentrations, and other factors associated with insulin production at 30 and 120 minutes following the sugar drink. The results showed that children with LBW had less insulin production, and that children with higher birth weight were more insulin-resistant. In addition, the rate of weight change between birth and age seven years was positively associated with both insulin concentrations and insulin resistance. Therefore, a relationship exists between birth weight, postnatal growth and aspects of insulin production and resistance. Lower birth weight, combined with greater postnatal weight gain, is

42 Feeley et al., 2009, pp. 118–123.
43 Feeley et al., 2009, pp. 118–123.
44 Ong et al., 2000, pp. 967–971.
45 Cameron, 2001, p. 48; Cameron et al., 2001, p. 154.
46 Crowther et al., 1998, pp. 1163–1167.

associated with poor glucose tolerance in childhood, which is indicative of a type 2 diabetes risk.[47]

In summary, the children in the Bt20+ birth cohort were born shortly after the release of Nelson Mandela in February 1990, but their patterns of growth are the result of the social, health and nutritional history of their mothers, in addition to their own exposure to the emerging post-apartheid society. Furthermore, with rapid urbanisation in Johannesburg–Soweto and corresponding social and economic transition, there is a greater potential for 'mismatch'. Populations undergoing socio-economic change show an increased risk of obesity, reduced physical activity, insulin resistance and elevated blood pressure as a result of the mismatch between a prenatal environment characterised by undernutrition and a postnatal environment characterised by exposure to inexpensive, energy-dense foods.[48] The mismatch concept can explain why effects such as obesity are now seen even among children in LMICs, and why they can manifest even with relatively small improvements in economic conditions.

Maternal mental health (Example 2)

As with nutrition, early psychological, social and material conditions influence young children's coping and response systems, including their stress reactions and tolerance.[49] Children exposed to toxic stress, in utero and in their early years, are at risk of developing high baseline stress levels and heightened vigilance with long-term consequences for their health, well-being and social relationships. Research on attachment confirms that the emotional warmth and responsiveness of the child's first relationships build children's self-efficacy, competence, and their expectations of relationships in the future.[50] Secure attachments enable young children to initiate relationships with others with confidence and engage in mutually enjoyable ways with children and adults.[51]

Maternal care is at the heart of ecological models incorporating biological, psychological and social influences on children's development,[52] and its influence is especially strong in the earliest years of life. A significant determinant of maternal sensitivity and responsivity—the building blocks of attachment—is maternal mental health.[53] Depression is common among women with young children. Postnatal depression is reported at around 10–13 per cent among women across the world, with

47 Crowther et al., 1998, pp. 1163–1167.
48 Hanson & Gluckman, 2008, pp. 90–93.
49 Shonkoff et al., 2009, pp. 2252–2259.
50 Bretherton, 2000, pp. 233–241.
51 Schneider et al., 2001.
52 Bronfenbrenner, 1979a, p. 844.
53 Dix, 1991, p. 3.

higher rates among women living under socio-economically stressful conditions. Rates as high as 30–50 per cent have been reported—for example, in Chile, Malawi, Vietnam and Zimbabwe—though some variation in rates may be related to differences in the assessment instruments used.[54] The symptoms of depression—sadness, withdrawal, self-preoccupation and fatigue—may interfere with warm, attentive, consistent and responsive caregiving, with adverse consequences for young children's growth and development.[55] A recent meta-analysis from 17 studies in 11 countries found that children of mothers with symptoms of depression were more likely to be either underweight or stunted. The public health significance of these findings is demonstrated by the estimate that close to 30 per cent fewer children would be stunted or underweight if they did not experience maternal depression.[56]

Findings from many high-income countries indicate that chronic postnatal depression, especially if combined with challenging socio-economic conditions, adversely affects children's cognitive and emotional functioning.[57] Although much less research has been conducted in LMICs, reports from India, Barbados, South Africa and Ethiopia confirm delays or dysfunction in aspects of children's development associated with maternal depression.[58]

Depression was assessed in Bt20+ among women in the third trimester of their pregnancy using the Pitt Depression Questionnaire,[59] together with possible predictors of depression. These included social and economic circumstances, social support, exposure to stressful life events, and women's recollections of their own childhood and their relationship with their parents. The rate of depression was high, with 16.4 per cent of women scoring above the designated cut-off. While many of the social factors assessed during pregnancy were associated with postnatal depression, only two emerged in multivariate analyses as independent predictors of postnatal depression, together with maternal education. These were social stress, specifically *witnessing a violent crime or feeling in danger of being killed*, and reporting difficulties with a partner.[60]

This was the first prospective study undertaken in Africa, of which we know, to examine antenatal risk factors for postnatal depression. The findings overall are similar to reports from American and European studies,[61] but for the prominence of witnessing or being in danger of violence as a risk factor for depression. The data were collected in Johannesburg–Soweto in 1990, at a time of notable social and

54 Parsons et al., 2011, pp. 89–110; Parsons et al., 2012, pp. 57–79.
55 Patel et al., 2004, p. 820; Rahman et al., 2004, pp. 946–952; Stewart et al., 2008, pp. 209–219.
56 Surkan et al., 2011, pp. 607–615.
57 Parsons et al., 2012, pp. 57–79.
58 Wachs et al., 2009, pp. 51–59.
59 Pitt, 1968, pp. 1325–1335.
60 Ramchandani et al., 2009, pp. 279–284.
61 Robertson et al., 2004, pp. 289–295.

political instability. There was widespread oppression of dissidents by the police and the army, as well as clashes with competing factions among black South Africans as political change intensified. Many civilians were caught in the cross-fire of a society undergoing a painful and violent transition.

Pregnancy is a period of enhanced sensitivity to environmental and personal security, as women prepare mentally and physically to bring a new life into the world. This was a very difficult period to be pregnant and vulnerable in Soweto. Postnatal depression has deleterious consequences for women's future mental health, their partnerships, their parenting capacity and their children's growth, health and development.

Children of postnatally depressed mothers were followed up and the physical growth and adjustment of these children was assessed when they were two years of age. More than 10 per cent of the children were rated by their mothers as having significant behaviour problems, 16 per cent were stunted and 4 per cent were wasted. As expected, children from poorer households were more likely to be undernourished, and boys were more likely to be rated as having behaviour problems than girls. Stunting was significantly associated with child behaviour problems, as was maternal postnatal depression, while controlling for a wide range of factors such as socio-economic status, gender, mother's age and preterm birth. In addition, children of depressed mothers were at a significantly higher risk of being stunted compared to children of non-depressed mothers. Interestingly, though, when stunting was controlled, the association between maternal postnatal depression and child behaviour problems was no longer statistically significant. This suggests that the association between maternal depression and child behaviour problems is mediated by the nutritional status of the child.[62]

This study was the first in Africa to find that maternal postnatal depression is linked to stunting at two years of age and that there is a strong independent association between children's poor growth and behaviour problems. One possible explanation for these findings is that postnatal depression impairs maternal parenting, including responsive feeding, irrespective of socio-economic status. Poor feeding and undernutrition affect children's mental and neuromuscular development resulting in maturational delays, and is also associated with clinging and irritability. While mother reports generally reflect reliable observations of children's behaviour,[63] we cannot exclude the possibility that depressed mothers may have tended to report a more negative pattern of child behaviour than non-depressed mothers. That is, smaller, more fractious and dependent preschoolers—characteristics of poorly growing children—are experienced by depressed women as difficult to manage.

62 Avan et al., 2010, pp. 690–695.

63 Van Zeijl et al., 2006, pp. 801–810.

In a follow-up analysis,[64] postnatal depression was found to be associated with children's behaviour problems at 10 years of age, controlling for maternal depression assessed at the same time using the Centre for Epidemiologic Depression Scale.[65] The South African Child Assessment Schedule (SACAS) was used to assess child behaviour problems at age 10 years.[66] Socio-economic status and current maternal depression were found to be associated with maternal postnatal depression and were included in the hierarchical regression analysis. We found that having a mother with clinical-level symptoms of postnatal depression increased the chances of 10-year-old children having clinically significant behaviour difficulties, particularly externalising behaviours, correcting for maternal depression at 10 years and socio-economic status. These findings are consistent with studies from high-income countries, which show that maternal postnatal depression is associated with both psychiatric and scholastic problems in later childhood.[67] While it is well accepted that the postnatal period is an important formative stage for child development, maternal postnatal depression may have more of an effect on children's development in highly stressful environments.

To conclude this section and introduce the next, social and economic conditions both contribute to and moderate maternal depression. Four recent systematic reviews have identified poverty and low socio-economic status, as well as a lack of social support, partner difficulties and recent stressful events as significant risk factors for maternal depression.[68] In addition, social and economic conditions have been found to be important moderators of the effects of parental depression on children.[69]

Social and economic environments (Example 3)

Bronfenbrenner's (1979) ecological systems theory holds that there are multiple influences on children's development, ranging from the proximal to distal influences of cultural and political systems. Furthermore, the effect of distal factors on young children generally operates through the proximal influence of parental emotional states and actions.[70] It is within this framework that a great deal of research on the effects of poverty on child development has been framed,[71] including work on risk, vulnerability and resilience.[72] In the same vein, the underlying question examined in

64 Verkuijl et al., 2014, pp. 454–460.
65 Radloff, 1977, pp. 385–401.
66 Barbarin & Richter, 2001, pp. 115–133.
67 Halligan et al., 2007, pp. 145–154; Murray et al., 2010, pp. 1150–1159.
68 Parsons et al., 2011, pp. 89–110.
69 Stein et al., 2008, pp. 603–612.
70 Bronfenbrenner, 1979b.
71 McLoyd & Wilson, 1991, pp. 105–133.
72 Garmezy, 1985, pp. 213–233; Garmezy & Rutter, 1983.

several papers from Bt20+ is, *what makes it possible for the majority of children to cope seemingly well under generally adverse social and economic conditions?*

In a series of papers, we have examined the impact of maternal, parenting, family and environmental factors on children's adjustment in early and late childhood and adolescence. These include: prenatal maternal stress, birth weight, maternal depression (described in the previous section), parenting relationships, household and community violence, and poverty. Poverty is an underlying cause of many of these adversities, but is not a simple construct. While material hardship increases parenting stress and maternal depression, there are potential compensating factors, including social capital. We defined social capital as the social and cultural assets of a family, over and above material and monetary resources. Adopting a multidimensional approach to poverty gives a different answer to the question: which children are poor? For example, an analysis of Bt20+ data in year five confirmed that childhood hunger is more likely to occur when mothers have limited education and low occupational status, but it is also more likely when a woman lives with her male partner in the absence of her own mother. Conversely, children living in households in which their mother lives with her mother (that is, a grandmother), but without a partner, are less likely to experience hunger.[73] Social relations and social support are important moderators of the impact of material scarcity.

We start by considering the role of prenatal maternal stress in the manifestation of behavioural problems among preschool children.[74] In animal and in human studies in resource-rich countries, prenatal stress accounts for a sizable proportion of the population attributable to risk for childhood problems.[75] Women enrolled in the Bt20+ study during pregnancy, completed stress and depression questionnaires. Child behavioural difficulties were assessed using an adapted version of the Richman Behaviour Screening Questionnaire.[76] As expected, relatively poorer women experienced higher levels of prenatal stress. Prenatal stress did not predict child behaviour problems at two years, but did so significantly when children were four years old, controlling for socio-economic status, gestational age and birth weight. Moreover, items tapping family stress were associated with child behaviour problems, rather than stresses associated with economic and social conditions. It should be noted though that we were not able to exclude the possibility that shared environmental factors, such as partner or family conflict, contribute to both increased prenatal stress and stresses to which children are exposed in their first few years of life, which result in behaviour problems, despite controlling for socio-economic conditions.

73 Barbarin & Khomo, 1997, pp. 193–222.
74 Ramchandani et al., 2010, pp. 239–247.
75 Talge et al., 2007, pp. 245–261.
76 Richman et al., 1975, pp. 277–287.

Turning to birth weight, many poor children, about 15 per cent in sub-Saharan Africa, start infancy at a disadvantage by being born below 2 500 grams.[77] LBW is an important public and individual health indicator, reflecting, among others, poverty, small maternal size and/or poor maternal nutrition, and it raises the risk of increased early mortality and morbidity. We examined the relationship between LBW and psychological adjustment in Bt20+ when the cohort was 12 years old. We used the Youth Self Report (YSR), a 112-item checklist, one of several scales developed by the Achenbach System of Empirically Based Assessment.[78] Social and psychological problems, that is, scores in the subclinical and clinical range, were reported by 28 per cent of girls and 39 per cent of boys. Controlling for socio-economic status, LBW did not increase the risk of emotional and social problems among young adolescents, nor was there an increased risk of maladjustment among young adolescents born of LBW who experienced higher rates of adverse life events at 12 years, nor among girls in various phases of puberty.[79] The findings from this analysis do not support a foetal origins explanation for the occurrence of emotional and behavioural problems in early adolescence.

The physical environment also affects the social adjustment and achievement of children. This occurs through several factors, including exposure to lead and other environmental toxins. Blood lead levels in Bt20+ children are higher than in urban children in high-income countries, mainly because of exposure to lead in paints. Poorer children have higher blood lead levels than their better-off counterparts.[80] Although we found boys to have higher blood lead levels than girls, increased lead levels measured at age 13 years were associated with significantly delayed puberty among girls, as assessed by age of menarche and self-reported Tanner staging for pubic hair and breast development.[81] Further, blood lead levels assessed at age 13 years were associated with aggressive behaviour and rule-breaking, especially among boys. Children's exposure to lead and other toxins needs to be reduced as part of a suite of interventions to reduce the public health problems and criminality associated with antisocial and aggressive behaviour in South Africa.

We tested the effects of children's exposure to violence on their psychological adjustment at age five years using a range of measures of exposure.[82] These included a Q-sort procedure completed by 'community experts', such as taxi drivers and community health workers, to rank the communities in which the children lived

77 United Nations Children's Fund/World Health Organization, 2004.
78 Achenbach, 1991.
79 Sabet et al., 2009, pp. 944–954.
80 Naicker et al., 2010, pp. 355–362.
81 Naicker et al., 2011, p. 119.
82 Barbarin et al., 2001, p. 16.

into several categories: data from police records on reported incidents of and arrests for violence in each community; reports of victimisation in response to a questionnaire administered to the child's mother, asking about having witnessed or experienced violence; and the Family Relations Scale which assesses, among other items, verbal and physical violence in the home. Children's psychological functioning was measured using the SACAS, an adaptation of the Child Behavior Checklist.[83] The effects of exposure to violence were independent of socio-economic status and gender. Boys and girls, whether economically advantaged or not, all evidenced similar difficulties in the face of violence, especially in terms of their attention, aggression and anxiety–depression. In a related analysis using data collected at six years of age, we examined children's social competence in association with community violence.[84] The relationship between competence, also assessed using the SACAS, and socio-economic status was linear, with better-off children being rated as having higher levels of social competence than their worse-off peers. However, the association between competence and violence was curvilinear. Children in the moderately safe communities had higher levels of social competence than children from the least safe and the safest communities, regardless of socio-economic status. We interpreted this as indicating, like the U-shaped function depicting response to stress,[85] that children benefit from awareness and exposure to the possibility of danger without being overwhelmed or preoccupied by fear. However, the data also suggest that even modest reductions of violence in dangerous neighbourhoods would be of considerable benefit to children.

Conclusions

Our aim in this chapter has been to illustrate the value of a life-course approach to understanding health and well-being, combining studies of biological, behavioural and psychosocial pathways that operate across an individual's life course, as well as across generations. Longitudinal studies, and especially prospective longitudinal birth cohort studies, are able to unravel both the temporal patterning of cycles of exposures and outcomes across time, as well as potential causal pathways that link experiences in early development with adult health and human capacity and the carry-over of effects on development into subsequent generations.

The Bt20+ is unique in this respect. Not only is it the largest and longest-running birth cohort study of health and development in Africa, but it is also one of only five such studies in the world. Having followed up more than 2 000 children for more

83 Achenbach & Edelbrock, 1983.
84 Barbarin & Richter, 1999, pp. 319–327.
85 Selye, 1978.

than two decades, the project is now enrolling the third generation—the children of the Bt20+ children—into a new cohort that will enable us to intensively study the impact of both social and biological factors on intergenerational health and human capacity.

We used three examples to illustrate the value of a life-course approach. In Example 1, we reviewed data on birth weight and subsequent growth, population changes in nutrition, and risks for obesity and metabolic disease in later life. In-depth studies of pregnancy, foetal maturation, and growth and development in the first two years of life are contributing to the mounting evidence for the crucial role that foetal and early life programming plays in later childhood, adolescent and adult health and well-being. The inimitable sensitivity of children to their environment during the first 1 000 days of life (the 270 days of pregnancy and the 365 days in each of the first two years of life) precipitates pathways of development and adaptation that reach far into the life span and into subsequent generations. Efforts to improve outcomes outside of this period seldom occur as a matter of course, particularly in low-resource settings[86] and planned interventions to make up for deficits at later ages are less effective in both cost and result.[87] Not only does the harm caused in early life lead to permanent impairment in later life stages but it also carries over and affects future generations. In 2008, Victora and colleagues linked undernutrition to birth weight in the next generation and maternal height and birth weight to the third generation; for every additional one kilogram of maternal birth weight, a mother could expect her child to be at least 208 grams heavier. In poor countries, heavier at birth is healthier and heavier babies are less likely to die or be stunted in their growth.[88]

Maternal mental health was the focus of Example 2 and evidence was provided for the association between symptoms of depression, such as sadness, withdrawal and fatigue, and adverse consequences for the growth and development of young children. In one of the first of its kind in Africa, the Bt20+ study demonstrated links not only between postnatal depression and mothers' perceptions of behavioural problems, but also with stunting and wasting in children at two years of age.[89] Maternal postnatal depression, among other exposures, impacts the development of children either as a direct effect or as a mediator.[90]

Example 3 dealt with the social and economic environment and emphasised the complexity in untangling mechanisms of influence on child health and well-being. Various distal factors, such as the socio-economic and cultural climate within which

86 Gordon et al., 2003.
87 Heckman, 2006, pp. 1900–1902.
88 Victora et al., 2008, pp. 340–357.
89 Ramchandani et al., 2009, pp. 279–284.
90 Lyons-Ruth et al., 1990, pp. 85–98.

children are raised, interact with and operate through proximal factors, including parent–child relationships and family experiences, to constitute the lived experience of the child. In some ways, this dynamic climate—comprising characteristics of the child, material conditions, family structure, environmental effects and sociopolitical changes—makes the goal of improving social and economic conditions for children a moving target. With the rapid expansion of urban populations in LMICs, there is an ongoing need to understand the various factors that precipitate changes in urban families and household structures. In their study on the material and social living conditions of a large sample of young adolescents in Johannesburg–Soweto between 2002 and 2003, Richter et al. (2009) highlight the numerous and overlapping risks associated with rapid urbanisation, from crowding and crime to pollution and poor economic growth.[91] This environment represents the increasingly challenging context in which families raise children. There are intergenerational effects of these suboptimal material and social living conditions, which are played out in the health and well-being of children.

The common thread in the child growth and development research is that it has become increasingly clear that it is never too early to begin to safeguard development and to compensate for difficulties. The importance of the first 1 000 days suggests that interventions during pregnancy and infancy are needed to address challenges facing mothers and their children in the LMICs. Indeed, one may argue that pre-pregnancy interventions are important to address intergenerational cycles of risk. This provides us with focal points for individual and group interventions; however, fundamental challenges that plague our societies on the community level, such as poverty, cannot be ignored. Poverty and inequity are both a cause and a consequence, creating a cycle that has deleterious long-lasting effects on the health, mental well-being, cognitive development, and subsequent productivity in adulthood, of millions of children. Poor nutrition, infection and a lack of both antenatal and obstetric care, and cognitive stimulation before the age of two years underlie the effects of poverty. Also, as low-income countries transition to middle-income status and middle-income countries become wealthier, new cycles of risk and 'mismatch' become evident. This is manifest in the emerging health threats of obesity and mental ill-health in LMICs. Therefore, cohort studies like Birth to Twenty are vital to feed evidence to both the scientific and policy arenas, so that we can become better at identifying and disrupting life-course pathways of risk.

91 Richter et al., 2009, pp. 197–203.

References

Achenbach, T. (1991). *Manual for the Youth Self Report and Profile*. Burlington, VT: University of Vermont.

Achenbach, T. & Edelbrock, C. (1983). *Manual for the Child Behavior Checklist*. Burlington, VT: University of Vermont.

Andor, L.E. (1966). *Aptitudes and Abilities of the Black Man in Sub-Saharan Africa, 1874–1963: An Annotated Bibliography*: Pretoria: National Institute for Personnel Research, South African Council for Scientific and Industrial Research.

Avan, B., Richter, L.M., Ramchandani, P.G., Norris, S.A. & Stein, A. (2010). Maternal postnatal depression and children's growth and behaviour during the early years of life: Exploring the interaction between physical and mental health. *Archives of Disease in Childhood*, 95(9), 690–695.

Barbarin, O.A. & Khomo, N. (1997). Indicators of economic status and social capital in South African townships. What do they reveal about the material and social conditions in families of poor children? *Childhood*, 4(2), 193–222.

Barbarin, O.A. & Richter, L.M. (1999). Adversity and psychosocial competence of South African children. *American Journal of Orthopsychiatry*, 69(3), 319–327.

Barbarin, O.A. & Richter, L.M (2001). Economic status, community danger and psychological problems among South African children. *Childhood, 8*(1), 115–133.

Barbarin, O.A., Richter, L.M. & DeWet, T. (2001). Exposure to violence, coping resources, and psychological adjustment of South African children. *American Journal of Orthopsychiatry*, 71(1), 16.

Barker, D.J. & Osmond, C. (1986). Infant mortality, childhood nutrition, and ischaemic heart disease in England and Wales. *The Lancet*, 327(8489), 1077–1081.

Barnard, R.J., Roberts, C.K., Varon, S.M. & Berger, J.J. (1998). Diet-induced insulin resistance precedes other aspects of the metabolic syndrome. *Journal of Applied Physiology*, 84(4), 1311–1315.

Black, R.E., Allen, L.H., Bhutta, Z.A., Caulfield, L.E., De Onis, M., Ezzati, M., … Rivera, J. (2008). Maternal and child undernutrition: Global and regional exposures and health consequences. *The Lancet*, 371(9608), 243–260.

Bretherton, I. (2000). Emotional availability: An attachment perspective. *Attachment and Human Development*, 2(2), 233–241.

Bronfenbrenner, U. (1979a). Contexts of child rearing: Problems and prospects. *American Psychologist*, 34(10), 844.

Bronfenbrenner, U. (1979b). *The Ecology of Human Development: Experiments by Nature and Design*. Cambridge, MA: Harvard University Press.

Cameron, N. (2001). Catch-up growth increases risk factors for obesity in urban children in South Africa by 1 year of age. *International Journal of Obesity*, 25(2), 48.

Cameron, N. & Kgamphe, J.S. (1988). Urbanisation and human growth in South African Blacks. *Collegium Anthropologicum Supplement*, 12, 224.

Cameron, N., Kgamphe, J.S., Lunz, R. & Knight, S. (1988). Single year height and weight velocities for South African rural Black children. *South African Journal of Science*, 8, 519–520.

Cameron, N., Pettifor, J., De Wet, T. & Norris, S. (2001). Catch-up growth in infancy predicts overweight and obesity at 9 years: Identifying the potentially obese adolescent. *Obesity Research*, 9(3), 154.

Crowther, N.J., Cameron, N., Trusler, J. & Gray, I.P. (1998). Association between poor glucose tolerance and rapid post natal weight gain in seven-year-old children. *Diabetologia*, 41(10), 1163–1167.

Dix, T. (1991). The affective organization of parenting: Adaptive and maladaptative processes. *Psychological Bulletin*, 110(1), 3.

Dubow, S. (1995). *Illicit Union: Scientific Racism in Modern South Africa*. Johannesburg: University of the Witwatersrand Press.

Elder, G. (1999). *Children of the Great Depression. Social Change in Life Experience*. Boulder, CO: Westview Press.

Evans, G.W. & Kim, P. (2007). Childhood poverty and health: Cumulative risk exposure and stress dysregulation. *Psychological Science*, 18(11), 953–957.

Feeley, A., Pettifor, J. & Norris, S. (2009). Fast-food consumption among 17 year olds in the Birth to Twenty cohort. *South African Journal of Clinical Nutrition*, 22(3), 118–123.

Fonn, S., De Beer, M., Kgamphe, J., McIntyre, J., Cameron, N., Padayachee, G., … Zitha, D. (1991). Birth to ten: Pilot studies to test the feasibility of a birth cohort study investigating effects of urbanisation in South Africa. *South African Medical Journal*, 79, 449–454.

Garmezy, N. (1985). Stress-resistant children: The search for protective factors. *Recent Research in Developmental Psychopathology*, 4, 213–233.

Garmezy, N. & Rutter, M. (1983). *Stress, Coping, and Development in Children*. New York: McGraw Hill.

Geber, M. (1958). The psycho-motor development of African children in the first year, and the influence of maternal behavior. *The Journal of Social Psychology*, 47(2), 185–195.

Goldberg, S. (1972). Infant care and growth in urban Zambia. *Human Development*, 15(2), 77–89.

Gordon, D., Nandy, S., Pantazis, C., Pemberton, S. & Townsend, P. (2003). *Child Poverty in the Developing World*. Bristol: Polity Press.

Grantham-McGregor, S., Cheung, Y.B., Cueto, S., Glewwe, P., Richter, L. & Strupp, B. (2007). Developmental potential in the first 5 years for children in developing countries. *The Lancet*, 369(9555), 60–70.

Halligan, S.L., Murray, L., Martins, C. & Cooper, P.J. (2007). Maternal depression and psychiatric outcomes in adolescent offspring: A 13-year longitudinal study. *Journal of Affective Disorders*, 97(1), 145–154.

Hanson, M.A. & Gluckman, P.D. (2008). Developmental origins of health and disease: New insights. *Basic & Clinical Pharmacology & Toxicology*, 102(2), 90–93.

Heckman, J.J. (2006). Skill formation and the economics of investing in disadvantaged children. *Science*, 312(5782), 1900–1902.

Holahan, C. & Sears, R. (1995). *The Gifted Group in Later Maturity*. Stanford, CA: Stanford University Press.

Hulshoff Pol, H.E., Hoek, H.W., Susser, E., Brown, A.S., Dingemans, A., Schnack, H.G., … Kahn, R. S. (2000). Prenatal exposure to famine and brain morphology in schizophrenia. *American Journal of Psychiatry*, 157(7), 1170–1172.

Keller, K. B., & Lemberg, L. (2003). Obesity and the metabolic syndrome. *American Journal of Critical Care*, 12(2), 167–170.

Liddell, C., & Kvalsvig, J. (1990). Science and social accountability: Issues related to South African developmental psychology. *South African Journal of Psychology*, 20(1), 1–9.

Lupien, S.J., King, S., Meaney, M.J. & McEwen, B.S. (2000). Child's stress hormone levels correlate with mother's socioeconomic status and depressive state. *Biological Psychiatry*, 48(10), 976–980.

Lyons-Ruth, K., Connell, D.B., Grunebaum, H.U. & Botein, S. (1990). Infants at social risk: Maternal depression and family support services as mediators of infant development and security of attachment. *Child Development*, 61(1), 85–98.

MacKeown, J., Cleaton-Jones, P. & Norris, S. (2003). Nutrient intake among a longitudinal group of urban black South African children at four interceptions between 1995 and 2000 (Birth-to-Ten Study). *Nutrition Research*, 23(2), 185–197.

Mamabolo, R.L., Alberts, M., Mbenyane, G.X., Steyn, N.P., Nthangeni, N.G., Delemarre-van De Waal, H.A. & Levitt, N.S. (2004). Feeding practices and growth of infants from birth to 12 months in the central region of the Limpopo Province of South Africa. *Nutrition*, 20(3), 327–333.

McLoyd, V.C. & Wilson, L. (1991). The strain of living poor: Parenting, social support, and child mental health. In A.C. Huston (ed.). *Children in Poverty: Child Development and Public Policy*. New York: Cambridge University Press, pp. 105–133.

Meigs, J.B. (2002). Epidemiology of the metabolic syndrome. *The American Journal of Managed Care*, 8, 283–292.

Murray, L., Arteche, A., Fearon, P., Halligan, S., Croudace, T. & Cooper, P. (2010). The effects of maternal postnatal depression and child sex on academic performance at age 16 years: A developmental approach. *Journal of Child Psychology and Psychiatry*, 51(10), 1150–1159.

Naicker, N., Norris, S., Mathee, A. & Richter, L.M. (2011). Lead exposure and the onset of puberty: Birth to Twenty Cohort. *Epidemiology*, 22(1), 119.

Naicker, N., Norris, S.A., Mathee, A., Von Schirnding, Y.E. & Richter, L.M. (2010). Prenatal and adolescent blood lead levels in South Africa: Child, maternal and household risk factors in the Birth to Twenty cohort. *Environmental Research*, 110(4), 355–362.

Najman, J.M., Aird, R., Bor, W., O'Callaghan, M., Williams, G.M. & Shuttlewood, G.J. (2004). The generational transmission of socioeconomic inequalities in child cognitive development and emotional health. *Social Science and Medicine*, 58(6), 1147–1158.

Norris, S.A., Griffiths, P., Pettifor, J.M., Dunger, D.B. & Cameron, N. (2009). Implications of adopting the WHO 2006 Child Growth Standards: Case study from urban South Africa, the Birth to Twenty cohort. *Annals of Human Biology*, 36(1), 21–27.

Norris, S.A., Richter, L.M. & Fleetwood, S.A. (2007). Panel studies in developing countries: Case analysis of sample attrition over the past 16 years within the birth to twenty cohort in Johannesburg, South Africa. *Journal of International Development*, 19(8), 1143–1150.

Ong, K.K., Ahmed, M.L., Emmett, P.M., Preece, M.A. & Dunger, D.B. (2000). Association between postnatal catch-up growth and obesity in childhood: Prospective cohort study. *British Medical Journal*, 320(7240), 967–971.

Parsons, C., Young, K., Cooper, P. & Stein, A. (2011). Postnatal depression and its effects on child development: A developing country perspective. In H. Fitzgerald, K. Puura, M. Tomlinson & C. Pau (eds). *International Perspectives on Children and Mental Health*. Santa Barbara, CA: ABC-CLIO INC, pp. 89–110.

Parsons, C.E., Young, K.S., Rochat, T.J., Kringelbach, M.L. & Stein, A. (2012). Postnatal depression and its effects on child development: A review of evidence from low- and middle-income countries. *British Medical Bulletin*, 101, 57–79.

Patel, V., Rahman, A., Jacob, K. & Hughes, M. (2004). Effect of maternal mental health on infant growth in low income countries: New evidence from South Asia. *British Medical Journal*, 328(7443), 820.

Pereira, M.A., Jacobs, D.R., Pins, J.J., Raatz, S.K., Gross, M.D., Slavin, J.L. & Seaquist, E.R. (2002). Effect of whole grains on insulin sensitivity in overweight hyperinsulinemic adults. *The American Journal of Clinical Nutrition*, 75(5), 848–855.

Pitt, B. (1968). 'Atypical' depression following childbirth. *The British Journal of Psychiatry*, 114(516), 1325–1335.

Popkin, B.M., Richards, M.K. & Montiero, C.A. (1996). Stunting is associated with overweight in children of four nations that are undergoing the nutrition transition. *The Journal of Nutrition*, 126(12), 3009.

Prader, A., Tanner, J. & Von Harnack, G. (1963). Catch-up growth following illness or starvation: An example of developmental canalization in man. *The Journal of Pediatrics*, 62(5), 646–659.

Radloff, L.S. (1977). The CES-D scale: A self-report depression scale for research in the general population. *Applied Psychological Measurement*, 1(3), 385–401.

Rahman, A., Iqbal, Z., Bunn, J., Lovel, H. & Harrington, R. (2004). Impact of maternal depression on infant nutritional status and illness: A cohort study. *Archives of General Psychiatry*, 61(9), 946–952.

Ramchandani, P.G., Richter, L.M., Norris, S.A. & Stein, A. (2010). Maternal prenatal stress and later child behavioral problems in an urban South African setting. *Journal of the American Academy of Child & Adolescent Psychiatry*, 49(3), 239–247.

Ramchandani, P.G., Richter, L.M., Stein, A. & Norris, S.A. (2009). Predictors of postnatal depression in an urban South African cohort. *Journal of Affective Disorders*, 113(3), 279–284.

Raudenbush, S.W. (2001). Comparing personal trajectories and drawing causal inferences from longitudinal data. *Annual Review of Psychology*, 52(1), 501–525.

Richardson, B.D. (1978). Growth-patterns of South African children overview. *South African Journal of Science*, 74(7), 246–249.

Richman, N., Stevenson, J. & Graham, P. (1975). Prevalence of behavior problems in 3-year-old children: An epidemiological study in a London borough. *Journal of Child Psychology and Psychiatry*, 16, 277–287.

Richter, L. & Dawes, A. (2008). A history of South African psychological research on child development. In C. v. Ommen & D. Painter (eds). *Interiors: A History of Psychology in South Africa*. Cape Town: UCT Press, pp. 286–323.

Richter, L., Norris, S., Pettifor, J., Yach, D. & Cameron, N. (2007). Cohort profile: Mandela's children: The 1990 Birth to Twenty study in South Africa. *International Journal of Epidemiology*, 36(3), 504–511.

Richter, L.M., Daelmans, B., Lombardi, J., Heymann, J., Boo, F.L., Behrman, J.R., … Dua, T. (2017). Investing in the foundation of sustainable development: Pathways to scale up for early childhood development. *The Lancet*, 389(10064), 103–118.

Richter, L.M., Norris, S.A. & De Wet, T. (2004). Transition from Birth to Ten to Birth to Twenty: The South African cohort reaches 13 years of age. *Paediatric and Perinatal Epidemiology*, 18(4), 290–301.

Richter, L.M., Panday, S. & Norris, S.A. (2009). Factors influencing enrolment: A case study from birth to twenty: The 1990 birth cohort in Soweto–Johannesburg. *Evaluation and Program Planning*, 32(3), 197–203.

Richter, L.M., Panday, S., Swart, T.M. & Norris, S.A. (2009). Adolescents in the city: Material and social living conditions in Johannesburg–Soweto, South Africa. *Urban Forum*, 20(3), 319–334.

Richter, L.M., Yach, D., Cameron, N., Griesel, R.D. & Wet, T. (1995). Enrolment into birth to ten (BTT): Population and sample characteristics. *Paediatric and Perinatal Epidemiology*, 9(1), 109–120.

Robertson, E., Grace, S., Wallington, T. & Stewart, D.E. (2004). Antenatal risk factors for postpartum depression: A synthesis of recent literature. *General Hospital Psychiatry*, 26(4), 289–295.

Rutter, M. (1994). Beyond longitudinal data: Causes, consequences, changes and continuity. *Journal of Consulting and Clinical Psychology*, 62(5), 928.

Sabet, F., Richter, L.M., Ramchandani, P.G., Stein, A., Quigley, M.A. & Norris, S.A. (2009). Low birthweight and subsequent emotional and behavioural outcomes in 12-year-old children in Soweto, South Africa: Findings from Birth to Twenty. *International Journal of Epidemiology*, 38(4), 944–954.

Schneider, B.H., Atkinson, L. & Tardif, C. (2001). Child–parent attachment and children's peer relations: A quantitative review. *Developmental Psychology*, 37(1), 86–100.

Schutte, A.E., Van Rooyen, J.M., Huisman, H.W., Kruger, H.S., Malan, N.T. & De Ridder, J.H. (2003). Dietary risk markers that contribute to the aetiology of hypertension in black South African children: The THUSA BANA study. *Journal of Human Hypertension*, 17(1), 29–35.

Selye, H. (1978). *The Stress of Life*. New York: McGraw-Hill.

Shonkoff, J.P., Boyce, W.T. & McEwen, B.S. (2009). Neuroscience, molecular biology, and the childhood roots of health disparities: Building a new framework for health promotion and disease prevention. *Journal of the American Medical Assocoation (JAMA)*, 301(21), 2252–2259.

Shrimpton, R., Victora, C.G., De Onis, M., Lima, R.C., Blössner, M. & Clugston, G. (2001). Worldwide timing of growth faltering: Implications for nutritional interventions. *Pediatrics*, 107(5), e75.

St Clair, D., Xu, M., Wang, P., Yu, Y., Fang, Y., Zhang, F., … Sham, P. (2005). Rates of adult schizophrenia following prenatal exposure to the Chinese famine of 1959–1961. *Journal of the American Medical Assocoation (JAMA)*, 294(5), 557–562.

Stein, A., Malmberg, L.E., Sylva, K., Barnes, J. & Leach, P. (2008). The influence of maternal depression, caregiving, and socioeconomic status in the post-natal year on children's language development. *Child: Care, Health and Development*, 34(5), 603–612.

Stein, A.D., Barnhart, H.X., Hickey, M., Ramakrishnan, U., Schroeder, D.G. & Martorell, R. (2003). Prospective study of protein-energy supplementation early in life and of growth in the subsequent generation in Guatemala. *The American Journal of Clinical Nutrition*, 78(1), 162–167.

Stein, A.D., Wang, M., Martorell, R., Norris, S.A., Adair, L.S., Bas, I., … Gigante, D.P. (2010). Growth patterns in early childhood and final attained stature: Data from five birth cohorts from low-and middle-income countries. *American Journal of Human Biology*, 22(3), 353–359.

Stewart, R.C., Umar, E., Kauye, F., Bunn, J., Vokhiwa, M., Fitzgerald, M., … Creed, F. (2008). Maternal common mental disorder and infant growth: A cross-sectional study from Malawi. *Maternal and Child Nutrition*, 4, 209–219.

Surkan, P.J., Kennedy, C.E., Hurley, K.M. & Black, M.M. (2011). Maternal depression and early childhood growth in developing countries: Systematic review and meta-analysis. *Bulletin of the World Health Organization*, 286, 607–615.

Talge, N.M., Neal, C. & Glover, V. (2007). Antenatal maternal stress and long-term effects on child neurodevelopment: How and why? *Journal of Child Psychology and Psychiatry*, 48(3–4), 245–261.

Tomkins, A. (2001). Nutrition and maternal morbidity and mortality. *British Journal of Nutrition*, 85(2), 93–99.

Tomlinson, M., Cooper, P. & Murray, L. (2005). The mother-infant relationship and infant attachment in a South African peri-urban settlement. *Child Development*, 76(5), 1044–1054.

Ulijaszek, S. & Henry, C.J.K. (1996). Introduction: Growth, development and the lifespan developmental perspective. In C.J.K. Henry & S. Ulijaszek (eds). *Long-term Consequences of Early Environment: Growth, Development and the Lifespan Developmental Perspective*. Cambridge: Cambridge University Press, p. 253.

United Nations Children's Fund/World Health Organisation. (2004). *Low Birth Weight: Country, Regional and Global Estimates*. Retrieved from: http://apps.who.int/iris/bitstream/10665/43184/1/9280638327.pdf

Van Zeijl, J., Mesman, J., Stolk, M.N., Alink, L.R., Van Ijzendoorn, M.H., Bakermans-Kranenburg, M.J., … Koot, H.M. (2006). Terrible ones? Assessment of externalizing behaviors in infancy with the Child Behavior Checklist. *Journal of Child Psychology and Psychiatry*, 47(8), 801–810.

Vanhala, M.J., Vanhala, P.T., Keinänen-Kiukaanniemi, S.M., Kumpusalo, E.A. & Takala, J.K. (1999). Relative weight gain and obesity as a child predict metabolic syndrome as an adult. *International Journal of Obesity and Related Metabolic Disorders*, 23(6), 656–659.

Verkuijl, N.E., Richter, L., Norris, S.A., Stein, A., Avan, B. & Ramchandani, P.G. (2014). Postnatal depressive symptoms and child psychological development at 10 years: A prospective study of longitudinal data from the South African Birth to Twenty cohort. *The Lancet Psychiatry*, 1(6), 454–460.

Victora, C.G., Adair, L., Fall, C., Hallal, P.C., Martorell, R., Richter, L.M. & Sachdev, H.S. (2008). Maternal and child undernutrition: Consequences for adult health and human capital. *The Lancet*, 371(9609), 340–357.

Victora, C.G., De Onis, M., Hallal, P.C., Blössner, M. & Shrimpton, R. (2010). Worldwide timing of growth faltering: Revisiting implications for interventions. *Pediatrics*, 125(3), 473–480.

Wachs, T.D., Black, M.M. & Engle, P.L. (2009). A global threat to children's health, development, and behavior and to human rights. *Child Development Perspectives*, 3(1), 51–59.

Walker, S.P., Wachs, T.D., Grantham-McGregor, S., Black, M.M., Nelson, C.A., Huffman, S.L., … Lozoff, B. (2011). Inequality in early childhood: Risk and protective factors for early child development. *The Lancet*, 378(9799), 1325–1338.

Warren, N. (1972). African infant precocity. *Psychological Bulletin*, 78(5), 353.

Yach, D., Padayachee, G., Cameron, N., Wagstaff, L. & Richter, L.M. (1990). 'Birth to Ten': A study of children of the 1990s living in the Johannesburg–Soweto area. *South African Medical Journal/Suid-Afrikaanse Tydskrif vir Geneeskunde*, 77(7), 325.

Chapter 8

Culture and attachment in Africa

Hiltrud Otto

Introduction

Relationships between children and their caregivers are universal components of all societies. Research dating back to the 1960s in the United States outlined theories about attachment between children and their mothers. This chapter explores 20th-century Western theory about familial attachment, along with its method of the 'Strange Situation Procedure', and how it was widely adapted in cross-cultural settings, including in many cultures and countries in Africa, and further questions the appropriateness of using such a model in a non-Western context.

Ethological attachment theory, as outlined by Bowlby (1969), is one of the major developmental theories of the last decades; it inspired researchers and clinicians alike. Bowlby defined attachment as an emotional bond between infant and caregiver that develops during the infant's first year of life.[1] He argued that the attachment system is a human universal that is genetically rooted. Fear and anxiety are conceived of as the driving emotions of the attachment system with the main function of maintaining contact with the mother in order to survive. According to Bowlby, individual experience with primary caregivers leads to generalised expectations and beliefs, so-called 'working models', about self, the world and relationships.[2] Such models determine how individuals perceive and act in their social environment. John Bowlby's seminal contribution to science is that 'attachment' has been placed at the centre of our understanding of human development, emphasising that socio-emotional development is central to all developmental domains.[3]

Mary Ainsworth, a long-term collaborator of John Bowlby, developed a standardised paradigm for the assessment and identification of individual differences in attachment relationships, known as the 'Strange Situation Procedure'.[4] The procedure, tested on 106 American children in Baltimore in the United States

1 Bowlby, 1969.
2 Bowlby, 1969.
3 Bretherton, 1997, pp. 33–43; Del Giudice & Belsky, 2010, pp. 112–113.
4 Ainsworth et al., 1978.

between 1963 and 1967, is based on the assumption that creating a sequence of stressful experiences for one-year-old children activates the attachment system and instigates attachment behaviours. This is achieved by taking a subject (the one-year-old child) to a 'strange' laboratory room for 20 minutes while his or her mother and a female stranger enter and leave the room alternately. Depending on the amount of the child's exploratory behaviour and reactions to the departure and return of the mother and a female stranger, children are categorised into three groups: (1) secure, (2) anxious-resistant and (3) anxious-avoidant. Each of these groups is supposed to reflect a different quality of attachment relationship with the mother. Subsequently, a fourth category was added by Mary Main and colleagues,[5] labelled 'disorganised attachment', which is characterised by bizarre infant behaviours like freezing or crouching on the floor in the presence of the caregiver during the Strange Situation. Disorganised attachment is considered to be an early predictor of both internalising and externalising forms of psychopathology.[6]

In Ainsworth's Baltimore study, children's behaviours in the Strange Situation could be linked to mother–child interactions that were observed during home visits over the first year of life.[7] Ainsworth et al. (1974) assumed that the behaviours displayed by children in the Strange Situation reflected internalised rules learnt from their caregiver, mostly the mother. With the help of home observations, Ainsworth hypothesised that differences in attachment quality might be due to differences in maternal sensitivity towards the child. She defined maternal sensitivity as the 'ability to perceive and interpret accurately the signals and communications in the infant's behaviour and, given this understanding, to respond to them appropriately and promptly'.[8] Following Ainsworth's studies, maternal sensitivity was regarded as a key indicator of the quality of mother–child interaction during the first year of life and was considered the most important antecedent for later attachment security.[9] In later years, the concept of sensitivity was expanded to include mothers' abilities to respond sensitively to infant mental states.[10]

Referring to Bowlby's and Ainsworth's theoretical and empirical evidence of the attachment system, researchers formulated four fundamental assumptions regarding the function and formation of attachment relationships. First, the assumption of *equivalence*: the Strange Situation is a universally valid procedure to uncover universal attachment patterns. Second, the assumption of *normativity*: the

5 Main & Solomon, 1986, pp. 95–124; Main & Solomon, 1990, pp. 121–160.
6 Lyons-Ruth et al., 1990, pp. 85–98.
7 Ainsworth et al., 1974, pp. 97–119.
8 Ainsworth et al., 1974, pp. 97–119.
9 Grossmann et al., 1985, pp. 233–256; Meins, 1999, pp. 307–324.
10 Meins et al., 2001, pp. 637–648.

secure attachment pattern represents a universal norm. Third, the assumption of *sensitivity*: attachment security is universally caused by maternal sensitivity. Fourth, the assumption of *competence*: attachment security is associated with emotional and cognitive competence.

Based on these assumptions, the Strange Situation was applied to children of different ages and from various economic and cultural backgrounds. The Strange Situation was conducted in several African cultures, including the Dogon of Mali,[11] the Gusii of Kenya[12] and the Pygmies of Zambia[13] (for an overview *see* Tomlinson, 2010).[14] Meta-analyses of cross-cultural Strange Situation studies show that the intracultural variation of attachment patterns is far greater than the intercultural variation,[15] though variance across culturally defined populations would be expected to exceed the intrapopulation variance.[16] Scrutinising the cultural definition of 'populations' in these studies, one can see populations are defined mainly at the level of countries. However, a cultural definition of populations should include other parameters besides geography, such as values and norms. There are always sub-groups within countries and the experiences of one group are not necessarily generalisable to another; for example, upper-, middle- and lower-class families often represent distinct sociocultural groups within a country, as they may hold divergent norms and values. Generally, a culturally sensitive assessment of contextual parameters defining populations is missing in these meta-analyses, and renders the results open to wide interpretations. In addition, ratings of children's behaviours in the Strange Situation varied across researchers with different cultural backgrounds, e.g., German researchers watching Japanese children, who were considered to be securely attached by Japanese raters, saw strong elements of disorganised behaviours.[17] Despite repeated inconsistencies, however, the appropriateness of the Strange Situation as a tool for measuring attachment qualities in diverse cultural contexts, as well as its underlying assumptions, was never questioned by ethological attachment theorists.

In the following paragraphs, we provide theoretical, anthropological, ethnological and cross-cultural evidence to demonstrate that the four assumptions (equivalence, normativity, sensitivity and competence) do not hold true generally, and, in particular, not in traditional African cultures. Instead, it can be shown that attachment theory is reflective of modern, middle-class, nuclear families in high-income countries, but not of the demographic pressures of high fertility and high childhood mortality found

11 True et al., 2001, pp. 1451–1466.
12 Kermoian & Leiderman, 1986, pp. 455–469.
13 Morelli & Tronick, 1991, pp. 91–114.
14 Tomlinson, 2010, pp. 9–17.
15 Van IJzendoorn & Kroonenberg, 1988, pp. 147–156.
16 LeVine, 2002; LeVine & Norman, 2001, pp. 83–104.
17 Grossmann & Grossmann, 1989, pp. 1–12.

in low-income countries today.[18] Moreover, historically, the majority of attachment researchers took American children's experiences as representative of children's development globally.[19] It is surprising that the immense cultural variability found in early childhood and its influence on child development was marginalised or neglected by ethological attachment research.

Theoretical challenges

The assumption of equivalence was justified on the grounds of the attachment system's biological basis and Ainsworth's field research in Uganda. However, scrutinising the early work of Bowlby and Ainsworth, the transfer of the Strange Situation to different cultural contexts contains an element of irony: Ainsworth herself had invented the Strange Situation because she recognised that a simple transfer of one method to a different cultural context did not produce the desired outcome. Natural observations during house visits allowed the observation of attachment behaviours only in Ugandan children, but not in Baltimore. The invention of the Strange Situation therefore resulted as a necessary procedural adaptation to the US context. Additionally, a direct transfer of the Strange Situation neglects the very important assumption that Bowlby conceived of attachment as an adaptive system. Adaptation—the process of becoming adapted—and the result of this process, adaptedness, are core concepts in Bowlby's original formulation of attachment theory. He stated: 'no system whatever can be so flexible that it suits all and every environment. This means that, when the structure of a system is considered, the environment within which it is to operate must be considered simultaneously.'[20] Despite the universal biological basis of the attachment system, it is highly flexible and environmentally responsive. Thus, the true consideration of a system's adaptation and adaptedness requires an understanding of the corresponding environment, because every individual becomes adjusted to a particular environment, which is often referred to as an ecological niche.[21]

Bowlby recognised that cultural contexts required specific adaptations. However, it is obvious that he originally had the 'Environment of Evolutionary Adaptedness' (EEA) in mind while conceptualising attachment theory. He conceived of the EEA as an environment in which mother–father child-rearing units were the norm, with the mother being the exclusive caretaker of a child.[22] It is, however, questioned

18 LeVine, 1988, pp. 3–12; Scheper-Hughes, 2003, pp. 119–130.
19 LeVine, 2010, pp. 513–521.
20 Bowlby, 1982.
21 Bowlby, 1982.
22 Bowlby, 1982.

whether this model really can be regarded as the template for all human groups.[23] Nevertheless, the EEA, as conceptualised by Bowbly, is very similar to the Victorian ideal of nuclear families, with a traditional division of labour: mothers taking care of children, fathers providing the family income.[24] Today, the family model of a nuclear family is prevalent in the so-called minority world, e.g., in Euro-American middle-class families. However, anthropology and sociobiology question this long-standing ideal of an EEA characterised by mother–father child-rearing units, and has brought into focus the possibility of assistance from group members other than genetic parents for child rearing. This model of extended family networks, where everyday life is arranged in accordance with a larger social community, is indeed the prevalent family model in much of the world.[25] Different family models develop according to the allowances and affordances of the physical structure of an environment, which will be described further.

Eco-cultural demands and offers

The allowances and affordances of eco-cultural contexts determine parameters regarding the fertility and mortality rates of populations. In turn, these rates help to define a population's socio-economic structure: the economic system (e.g., subsistence, cash economy, capitalism), the structure of society (e.g., hierarchy, equality), and family and household types (e.g., nuclear, extended). Considered as a whole, these factors lead to the emergence of adequate socialisation strategies, composed of parental ideas and practices embodying traditional knowledge about the optimal parenting strategy within a specific cultural context.[26] The most common differentiation of existing sociocultural contexts lies in the distinction between Western and non-Western cultural orientations, representing two extremes with respect to socio-demographic characteristics.[27]

Having only a small number of children, as in the case of Western nuclear families, can be regarded as *one* adaptive reproductive strategy; for example, American middle-class parents, faced with high economic costs for raising children, but provided with good health care, typically follow the strategy of having fewer children. They focus on equipping the infant with competencies necessary for the attainment of a job or a

23 Foley, 1995, pp. 194–203; Irons, 1998, pp. 194–204.
24 Hrdy, 2005, pp. 9–32.
25 Hrdy, 2005, pp. 9–32.
26 Keller et al., 2008, pp. 217–226; Super & Harkness, 1986, pp. 545–569.
27 Kağıtçıbaşı, 1996; Kärtner et al., 2007, pp. 613–628; Markus & Kitayama, 1991, pp. 224–253.

professional career.[28] The self-concept that is adaptive in those Western families is the autonomous self, which defines a person as an individual agent that is unique, self-contained and separate from others.[29] Accordingly, studies have shown that Western mothers socialise their children to promote early independence and value goals such as 'learning to be different from others', 'expressing own ideas' and 'being assertive'. Attachment theory's conception of sensitive parenting is very much in line with these socialisation goals.[30]

However, there is also an alternative adaptive reproductive strategy: having many children. This strategy is adaptive in environments with a high infant-mortality rate and difficulty assuring subsistence, where the optimal strategy is to have as many children as possible and to focus on an infant's physical survival.[31] The latter strategy is prevalent in many traditional African cultures characterised by insufficient medical care, poor economic support and little formal education. Rural farming villagers, pastoral nomads or hunter/gatherer groups typically follow this strategy.[32] The self-concept in this context is the relational self. Here a person is defined as a communal agent that is basically interconnected, role-oriented and compliant.[33] In relational sociocultural contexts, socialisation goals promoting interdependence and harmonious relationships are prevalent.[34] For example, research by Kärtner et al. and Keller et al. found Cameroonian Nso mothers to value socialisation goals such as 'learning to share with others', 'obeying the parents' and 'maintaining social harmony'.[35] These values are not considered to be important in attachment theory, mainly because attachment theory focuses on the monotropic relationships between the child and a caregiver and not on the polytropic relationships that characterise relational sociocultural contexts.[36]

Social versus biological parenthood

There are more than 3 000 different ethnic groups in Africa, and most of these are extremely different from Ainsworth's middle-class families in the United States. While

28 Bornstein & Bradley, 2003; LeVine et al., 1994.
29 Kağitcibaşi, 1996, pp. 180–186; Kärtner et al., 2007, pp. 613–628.
30 Otto & Keller, 2015, pp. 81–94.
31 Kaplan & Gangestad, 2005; LeVine et al., 1994.
32 Kärtner et al., 2007, pp. 613–628.
33 Kağitcibaşi, 1996, pp. 180–186.
34 Keller et al., 2006, pp. 155–172.
35 Kärtner et al., 2007, pp. 613–628; Keller et al., 2006, pp. 155–172.
36 Keller & Otto, 2009, pp. 996–1011.

all families and communities face universal problems in raising their children,[37] anthropologists have investigated extensively how African cultures have solved these problems.[38] The solutions offered by anthropologists differ markedly from the solutions formulated by attachment theorists.

Western nuclear families usually adhere to attachment theory's assumption of the mother being the primary caregiver of a child.[39] However, in most traditional African sociocultural contexts, families usually live as extended families and draw on a network of relatives when caring for an infant.[40]

Often, in many parts of Africa, maternal relatives and siblings spend more time with an infant than the mother herself.[41] An example of a full-scale, multiple childcare system from the moment a child is born is found among the Efe of Zaire. Newborns are passed between women who collectively hold, carry and nurse the infant. At the age of six weeks, Efe infants spend more time with people other than the biological mother.[42] Multiple caretaking is also frequent among the Cameroonian Nso. For children, it is natural to grow up among many relatives who share child-care responsibilities and to whom children are committed throughout their lives.[43] Goody (1982) calls this phenomenon 'social parenthood' and refers to it as an African phenomenon. An emphasis on social parenthood instead of biological parenthood is especially notable in societies where high mortality and high fertility rates force mothers to economise their energy.[44] Weisner et al. (1997) and Otto (2009) report that impossible demands are placed on single mothers in Kenya and Cameroon when they are forced to provide their children with adequate resources alone.[45] The respective socio-economic conditions make it impossible for the mother alone to care for babies without the help of extended family networks.

From an evolutionary viewpoint, living in social units offers advantages such as a lesser probability of being attacked, a better defence against aggressors and more efficient food acquisition. While nuclear families can survive and reproduce, they are likely to fall short compared to families that can rely on a more extensive network of

37 Weisner et al., 1997.
38 Barlow, 2004, pp. 514–537; Cole & Cole, 1989; Seymour, 2004, pp. 538–556.
39 Neckoway et al., 2007, pp. 65–74.
40 Bornstein & Bradley, 2003; Keller, 2003, pp. 288–311; Lamb et al., 2002; Meehan & Hawks, 2014, pp. 113–140.
41 Rothbaum et al., 2002, pp. 330–352.
42 Ivey, 2000, pp. 856–866.
43 Verhoef, 2005, pp. 369–390.
44 Goody, 1982.
45 Weisner et al., 1997; Otto, 2009.

support,[46] which is especially important in scant and unpredictable environments. If our ancestors had lived in larger social units, attachment might not be the tie to the biological mother but emotional bonds with many social others that serve similar functions.[47] Multiple caretaking arrangements, as observed in many African cultures, seem to foster the establishment of attachment to other interaction partners, not only the biological parents.[48] Attachment theory, however, does not include wider social relationships other than mothers, and in some cases fathers, except to suggest that the mother–infant attachment relationship becomes a template for future relationships.[49] To be universally applicable, attachment theory has to detach itself from a dyadic view of attachment relationships and incorporate the possibility of multifaceted attachment relationships.

Stranger anxiety

A child's early familiarisation with many different caretakers may also cause children to feel relatively at ease with strangers. Attachment researchers included the confrontation with an unfamiliar female stranger in their paradigm of the Strange Situation. Differences in the expression of 'stranger anxiety'[50] in response to being picked up and put down by the stranger are assessed as one indicator of a child's attachment classification.[51] Stranger anxiety, however, does not seem to be a human universal: Gottlieb (2004; 2014) reports almost complete absence of stranger anxiety in Beng infants of Côte d'Ivoire.[52] Due to work and social demands, from birth, Beng mothers share their babies with as many people as possible from early morning. As a result, these children did not show any negative emotions towards the strange and white anthropologist, who wrote: 'the babies I observed went willingly to their new temporary caretakers, and it was rare for them to cry or otherwise express regret, fear, anxiety or anger when their mothers disappeared from view'.[53] The Beng mothers socialise their babies to be minimally attached to the mothers; at the same time, they provide a dense social network with many caretakers and a high comfort level with strangers. This socialisation strategy and the developmental consequences are very similar to our findings in Cameroon. Cameroonian Nso mothers call a child who exhibits stranger anxiety 'naughty'; instead,

46 Mace & Sear, 1997, pp. 499–507.
47 Belsky, 1999; Trivers, 1996.
48 Porges, 1997, pp. 62–77.
49 Lewis, 2005, pp. 8–27; Lewis & Takahashi, 2005, pp. 5–7.
50 Spitz, 1965.
51 Ainsworth et al., 1978.
52 Gottlieb, 2004; Gottlieb, 2014, pp. 187–214.
53 Gottlieb, 2004.

they consider a 'calm' child to be a good child.[54] Accordingly, Nso mothers actively, and sometimes even forcefully, train their children to stay calm with unfamiliar people and to control their emotional expressivity from early on. This parenting strategy results in the majority of children not showing stranger anxiety at one year of age; instead, Nso children stay extremely calm and inexpressive and greet female strangers in a friendly way, even white strangers.[55]

Putting the 'ideal' Beng or Nso child in the Strange Situation would likely yield unexpected results, as friendly behaviour towards a stranger would not earn those babies the status of being securely attached. Secure behaviours displayed in the Strange Situation can, therefore, not be regarded as representing the normative and optimal behavioural strategy of children all over the world. Instead, cultural contexts determine the norms and deviations of behavioural strategies.

Parenting behaviours

The representative for attachment theory's ideal of good parenting is the sensitive mother. Such mothers were found to use a distal strategy of parenting, focusing on verbal exchanges, object play and face-to-face contact within the context of exclusive attention. Thereby, even young infants are supposed to experience a feeling of uniqueness and self-efficacy. Analysing mother–child discourse, we found that Western (German) mother–child dyads are characterised by an alternating, turn-taking style of communication, thereby emphasising the ego boundaries of the baby.[56] Moreover, Western mothers lead mentalistic conversations, especially dialogues about emotional mental states,[57] which Bowlby conceived of as an important mechanism to transmit the parental attachment model to the child. Meins and Fernyhough (1999) reconsidered sensitivity and suggested that appropriate 'mind-minded' talk, in addition to sensitive parenting, leads to secure attachments.[58] Here, 'mind-mindedness' is defined as treating babies as individuals motivated by feelings, thoughts and intentions.

However, cross-cultural studies show that conceptions of good parenting are inextricably linked to eco-cultural contexts: not all cultures interpret a child's needs in the same way or react in the same manner to children's signals and behavioural expressions.[59] The parenting style found in rural, non-Western mothers with low formal education

54 Otto, 2009; Otto & Keller, 2015, pp. 81–94.
55 Otto, 2009.
56 Keller et al., 2008, pp. 217–226; Otto, 2009.
57 Demuth, 2009.
58 Meins & Fernyhough, 1999, pp. 363–380.
59 Harwood, 1992, pp. 822–839; Harwood et al., 1995; Neckoway et al., 2007, pp. 65–74.

tends to be the so-called proximal parenting style, with an emphasis on primary care, physical closeness and body stimulation in the context of shared attention.[60]

The proximal parenting style is assumed to foster a feeling of belonging and the development of relatedness. With respect to discourse style, rural Cameroonian Nso dyads are characterised by rhythmic overlapping vocalisations/verbalisations; this co-action mode may be assumed to foster the experience of synchrony between organisms. The Nso mother–child discourse is clearly normative-hierarchical, positioning the child as having to obey and comply in a hierarchical set,[61] which becomes particularly evident when socially undesirable behaviour is enacted by the child. Talking to infants in a mind-minded style is conceived of as ludicrous or even insane by Cameroonian Nso mothers, as they perceive small babies as not capable of having intentions or wishes.

Due to the fact that Nso children are never left alone, but are always in close proximity with the mother or other caregiver, one would assume that to be completely alone would be extremely unusual and stressful for these children; Takahashi (1990) observed this phenomenon in Japanese infants who had experienced the constant presence of a caregiver and were overstressed by the Strange Situation.[62] A hypothetical thought experiment[63] of applying the Strange Situation in the Nso community might reveal the difficulties resulting from the diverse cultural meaning systems: the very moment a Nso child is left alone—at worst alone inside a room—would most likely lead to severe distress and crying. The consequence would be that all people within hearing distance would gather to inquire about the problem, prepared to help. One can assume that the Nso, with their focus on bodily proximity and the prevention of negative infant signals, may judge the procedure of leaving a crying child alone as loveless, cruel and irresponsible. The main outcome of applying the Strange Situation may hence be a refusal of Nso families to take part in these kinds of 'immoral' studies in the future, and the scientific insight that being left alone puts extreme stress on Nso children. Applying attachment theory's classification scheme, the severe distress manifested by Nso children in the Strange Situation, might lead to a classification of insecure attachment.

Additionally, Neckoway et al. (2007) cite African mothers and shared parenting practices as representing a parenting style that might be classified as insensitive according to attachment theory.[64] However, we learnt from the Nso that mothers are not expected to be responsive to the infant's communicative initiatives. Mothers are

60 Keller et al., 2005, pp. 158–180; Keller et al., 2004, pp. 1745–1760.
61 Demuth, 2009.
62 Takahashi, 1990, pp. 141–150.
63 Otto, 2009.
64 Neckoway et al., 2007, pp. 65–74.

rather expected to know what is best for the baby and to exert responsible control. For the Cameroonian Nso, good parenting is characterised by parents taking the lead by controlling and directing the infant.[65] This strategy characterises a responsible parenting style that puts into practice the most central socialisation goal, i.e., the infant's obedience and accepting responsibility.[66] From the perspective of attachment theory, the Nso parenting style would not predict securely attached infants; instead, controlling and intrusive behaviours would predict less favourable attachment styles.

The development of competence

There is no doubt that early experience influences later development, and this holds especially true for emotionally or affectively charged experiences with important social others. Schore (2015) and Thompson (2000) point out that early attachment experiences shape the development of a unique personality and influence psychological well-being and resistance to stress experienced throughout a life time.[67] Studies have found evidence that securely attached infants are more likely to be cooperative and affectionate with their parents than are toddlers with other attachment histories,[68] and that securely attached toddlers are more social with peers and unfamiliar adults than those who are anxiously attached.[69] However, because attachment theory is not very clear about the range of consequences that could reasonably be anticipated from early security, attachment researchers disagree about the scope of the theoretically predicted sequelae of attachment security and explore a wide variety of expected outcomes.[70] Following a literature review, Thompson and Lagattuta (2006) arrived at the conclusion that only secure and disorganised attachment patterns have predictable outcomes: they are stable over time insofar as secure/disorganised parent–child relationships are likely to remain the same in future years as those patterns are mutually rewarding or self-perpetuating.[71]

A cultural perspective poses additional problems: cross-cultural studies have demonstrated that the definition of competence varies in accordance with the sociocultural context and parents apply different parenting strategies to foster the desired competencies in their children.[72] For example, Weisner (1984) found that Western societies promote increased individual goal-setting, competitiveness between children, and non-affiliative, egoistic and dominant social behaviours, as

65 Keller et al., 2008, pp. 217–226.
66 Yovsi et al., 2009, pp. 701–707.
67 Schore, 2015; Thompson, 2000, pp. 145–152.
68 Kochanska et al., 2005, pp. 648–660; Londerville & Main, 1981, pp. 289–299.
69 Boldt et al., 2014, pp. 211–229; Elicker et al., 1992.
70 Thompson & Lagattuta, 2006.
71 Thompson & Lagattuta, 2006.
72 Keller, 2003, pp. 288–311; Sigel et al., 2014.

well as a decline in the use of sibling caretaking, whereas non-Western societies promote affiliation, cooperation, pro-social and nurturing behaviours in children.[73] Similarly, Keller et al. (2004) found that the different parenting styles seemed to promote different kinds of competencies in infants. Supportive evidence was found with regard to the development of compliance and self-recognition: toddlers of non-Western Cameroonian Nso farmers, who experienced a proximal parenting style, showed compliant behaviours—indicative of successful self-regulation—earlier than Western children, who experienced a distal parenting style and recognised themselves earlier in a mirror.[74]

Conclusions and outlook

Attachment relationships are human universals: children all over the world form relationships with significant social others, and these relationships are highly influential in children's future development. Over the last decades, many precursors and consequences of attachment relationships have been reliably identified; yet, most results were obtained from research on Western middle-class families, which represent a very specific context.

However, systematic research in the cultural rationales of child-care practices and settings in non-Western contexts, or on their effects on child rearing and early child development, are still largely missing in the literature. Ethological attachment theory's core assumptions may underestimate the power of the social and cultural factors that shape attachment relationships: the cultural meanings of fertility, birth and death; the mother's assessment of her economic resources and social support; and prevailing belief systems. All these factors influence the development of emotion-regulation competencies in children and shape culturally adaptive attachment patterns; a comprehensive overview of attachment across different cultural contexts has been provided by two recent books.[75]

Most traditional African mothers do not follow the ideal of exclusive mothering, as do most mothers in rural non-Western contexts; instead, they rely on multiple caregiving arrangements. Nevertheless, their children grow up within the range of normal development. Sensitivity, as defined by Ainsworth, is often not really relevant to mothers from subsistence-based ecologies like the Nso. Good mothering, as defined by Nso mothers, assigns the lead for development to the mother as she guides the infant to a desired developmental goal. She is the expert who can apply the appropriate measure for promoting optimal development.[76] In Western cultures,

73 Weisner, 1984.
74 Keller et al., 2004, pp. 1745–1760.
75 Otto & Keller, 2014; Quinn & Mageo, 2013.
76 Yovsi et al., 2009, pp. 701–707.

a sensitive parenting style leads to the secure attachment status of the child, whereas in the Nso culture, a parenting style of responsible control leads to the emotion regulation of the child.

Accordingly, a valid evaluation of attachment patterns has to take into account the cultural values that frame the behaviour and that define its adaptiveness. For example, calm and quiet children may be adaptive in contexts in which work and social demands urge mothers to share their babies with as many people as possible from early on. The physical availability of a variety of caretakers guarantees the security of the child in unpredictable and potentially dangerous environments. The expression of emotions is useful in societies where parents expect early agency and psychological independence. In such sheltered environments, the formation of exclusive relationships leads to dyadic emotional bonds that focus on the psychological security of the child.

Consequently, a culturally valid assessment of attachment has to rely on an emic approach that includes an analysis of socio-ecologic and socio-demographic parameters, and explores parenting belief systems and everyday experiences. Also, the observation of behavioural responses to stress has to be built into the everyday context. On the one hand, we consider it to be ethically problematic to bring children into situations that would be regarded as unacceptable by the community. On the other hand, the use of an artificial standardised situation and a predetermined coding system for the evaluation of behavioural styles may not grasp the nature of the phenomenon in context. The development of attachment relationships has to be treated as a phenomenon with a biological basis that is socially shaped and made meaningful, i.e., adaptive, through culture.

Infants' early social experiences offer excellent leverage to improve their future lives. The provision of basic needs secures infant survival, but child thriving and learning is attained through socio-emotional and cognitive care. An investment in children's early social development is widely considered a *sine qua non* to sustainably promote human development. Traditional African societies are especially valuable for the study of children's early socio-emotional development, as they provide an array of various determinants of attachment relationships: different ecologies, different subsistence forms, different living arrangements and different child-rearing customs. In future research, these parameters have to be taken into consideration systematically if we want to understand attachment relationships and their development on a global scale.

References

Ainsworth, M.D.S., Blehar, M.C., Waters, E. & Wall, S. (1978). *Patterns of Attachment: A Psychological Study of the Strange Situation*. Mahwah, NJ: Lawrence Erlbaum Associates, Inc.

Ainsworth, M.S., Bell, S.M. & Stayton, D.F. (1974). Infant–mother attachment and social development: Socialization as a product of reciprocal responsiveness to signals. In M.P.M. Richards (ed.). *The Integration of a Child into a Social World*. London: Cambridge University Press, pp. 97–119.

Barlow, K. (2004). Critiquing the 'good enough' mother: A perspective based on the Murik of Papua New Guinea. *Ethos*, 32(4), 514–537.

Belsky, J. (1999). Modern evolutionary theory and patterns of attachment. In J. Cassidy, P.R. Shaver, J. Cassidy & P.R. Shaver (eds). *Handbook of Attachment: Theory, Research, and Clinical Applications*. New York: Guilford Press.

Boldt, L.J., Kochanska, G., Yoon, J.E. & Koenig Nordling, J. (2014). Children's attachment to both parents from toddler age to middle childhood: Links to adaptive and maladaptive outcomes. *Attachment and Human Development*, 16(3), 211–229.

Bornstein, M.H. & Bradley, R.H. (2003). *Socio-economic Status, Parenting, and Child Development*. Mahwah, NJ: Lawrence Erlbaum Associates, Inc.

Bowlby, J. (1969). Attachment. *Attachment and Loss*, Vol. 1. New York: Basic Books.

Bowlby, J. (1982). Attachment. *Attachment and Loss*, Vol. 1, 2nd edn. New York: Basic Books.

Bretherton, I. (1997). Bowlby's legacy to developmental psychology. *Child Psychiatry & Human Development*, 28(1), 33–43.

Cole, M. & Cole, S.R. (1989). *The Development of Children*. New York: Freeman.

Del Giudice, M. & Belsky, J. (2010). Evolving attachment theory: Beyond Bowlby and back to Darwin. *Child Development Perspectives*, 4(2), 112–113.

Demuth, C. (2009). Talking to infants: How culture is instantiated in early mother–infant interactions. The case of Cameroonian farming Nso and North German middle-class families. (Unpublished doctoral thesis), University of Osnabrück, Germany.

Elicker, J., England, M. & Sroufe, L.A. (1992). Predicting peer competence and peer relationships in childhood from early parent–child relationships. In R.D. Parke & G.W. Ladd (eds). *Family–peer Relationships: Modes of Linkage* (Vol. 77). Hillsdale, NJ: Lawrence Erlbaum Associates.

Foley, R. (1995). The adaptive legacy of human evolution: A search for the environment of evolutionary adaptedness. *Evolutionary Anthropology: Issues, News and Reviews*, 4(6), 194–203.

Goody, E.N. (1982). *Parenthood and Social Reproduction: Fostering and Occupational Roles in West Africa*. Cambridge: Cambridge University Press.

Gottlieb, A. (2004). *The Afterlife is Where We Come From*. Chicago, IL: University of Chicago Press.

Gottlieb, A. (2014). Is it time to detach from attachment theory? Perspectives from the West African rain forest. In H. Otto & H. Keller (eds). *Different Faces of Attachment: Cultural Variations on a Universal Human Need*. New York: Cambridge University Press, pp. 187–214.

Grossmann, K., Grossmann, K.E., Spangler, G., Suess, G. & Unzner, L. (1985). Maternal sensitivity and newborns' orientation responses as related to quality of attachment in northern Germany. *Monographs of the Society for Research in Child Development*, 50(1–2), 233–256.

Grossmann, K.E. & Grossmann, K. (1989). Preliminary observations on Japanese infants' behavior in Ainsworth's strange situation. *Research and Clinical Center for Child Development*, 11(87), 1–12.

Harwood, R.L. (1992). The influence of culturally derived values on Anglo and Puerto Rican mothers' perceptions of attachment behavior. *Child Development*, 63(4), 822–839.

Harwood, R.L., Miller, J.G. & Irizarry, N.L. (1995). *Culture and Attachment: Perceptions of the Child in Context.* Culture and Human Development: A Guilford Series. New York: Guilford Press.

Hrdy, S.B. (2005). Evolutionary context of human development: The cooperative breeding model. In C.S. Carter, L. Ahnert, K.E. Grossmann, S.B. Hrdy, M.E. Lamb, S.W. Porges & N. Sachser (eds). *Attachment and Bonding: A New Synthesis*. Cambridge, MA: MIT Press, pp. 9–32.

Irons, W. (1998). Adaptively relevant environments versus the environment of evolutionary adaptedness. *Evolutionary Anthropology: Issues, News and Reviews*, 6(6), 194–204.

Ivey, P.K. (2000). Cooperative reproduction in Ituri Forest hunter-gatherers: Who cares for Efe infants? *Current Anthropology*, 41(5), 856–866.

Kağitçibaşi, C. (1996). The autonomous-relational self: A new synthesis. *European Psychologist*, 1(3), 180–186.

Kağitçibaşi, Ç. (1996). *Family and Human Development Across Cultures: A View From the Other Side*. Mahwah, NJ: Lawrence Erlbaum Associates.

Kaplan, H.S. & Gangestad, S.W. (2005). Life history theory and evolutionary psychology. In D.M. Buss & D.M. Buss (eds). *The Handbook of Evolutionary Psychology*. Hoboken, NJ: John Wiley & Sons Inc.

Kärtner, J., Keller, H., Lamm, B., Abels, M., Yovsi, R.D. & Chaudhary, N. (2007). Manifestations of autonomy and relatedness in mothers' accounts of their ethnotheories regarding child care across five cultural communities. *Journal of Cross-Cultural Psychology*, 38(5), 613–628.

Keller, H. (2003). Socialization for competence: Cultural models of infancy. *Human Development*, 46(5), 288–311.

Keller, H., Lamm, B., Abels, M., Yovsi, R., Borke, J., Jensen, H., … Tomiyama, A.J. (2006). Cultural models, socialization goals, and parenting ethnotheories: A multicultural analysis. *Journal of Cross-Cultural Psychology*, 37(2), 155–172.

Keller, H. & Otto, H. (2009). The cultural socialization of emotion regulation during infancy. *Journal of Cross-Cultural Psychology*, 40(6), 996–1011.

Keller, H., Otto, H., Lamm, B., Yovsi, R.D. & Kärtner, J. (2008). The timing of verbal/vocal communications between mothers and their infants: A longitudinal cross-cultural comparison. *Infant Behavior and Development*, 31(2), 217–226.

Keller, H., Voelker, S. & Yovsi, R.D. (2005). Conceptions of parenting in different cultural communities: The case of West African Nso and Northern German women. *Social Development*, 14(1), 158–180.

Keller, H., Yovsi, R.D., Borke, J., Kärtner, J., Jensen, H. & Papaligoura, Z. (2004). Developmental consequences of early parenting experiences: Self regulation and self recognition in three cultural communities. *Child Development*, 75(6), 1745–1760.

Kermoian, R. & Leiderman, P. (1986). Infant attachment to mother and child caretaker in an East African community. *International Journal of Behavioral Development*, 9, 455–469.

Kochanska, G., Aksan, N. & Carlson, J.J. (2005). Temperament, relationships and young children's receptive cooperation with their parents. *Developmental Psychology*, 41(4), 648–660.

Lamb, M.E., Bornstein, M.H. & Teti, D.M. (2002). *Development in Infancy: An Introduction*, 4th edn. Mahwah, NJ: Lawrence Erlbaum Associates.

LeVine, R.A. (1988). Human parental care: Universal goals, cultural strategies, individual behavior. *New Directions for Child and Adolescent Development,* 40, 3–12.

LeVine, R.A. (2002). Contexts and culture in psychological research. *New Directions for Child and Development*, 96, 101–106.

LeVine, R.A. (2010). The six cultures study: Prologue to a history of a landmark project. *Journal of Cross-Cultural Psychology*, 41(4), 513–521.

LeVine, R.A., Dixon, S., LeVine, S., Richman, A., Leiderman, P.H., Keefer, C.H. & Brazelton, T.B. (1994). *Child Care and Culture: Lessons from Africa*. New York: Cambridge University Press.

LeVine, R.A. & Norman, K. (2001). The infant's acquisition of culture: Early attachment reexamined in anthropological perspective. In C.C. Moore & H.F. Mathews (eds). *The Psychology of Cultural Experience*. Cambridge: Cambridge University Press, pp. 83–104.

Lewis, M. (2005). The child and its family: The social network model. *Human Development*, 48, 8–27.

Lewis, M. & Takahashi, K. (2005). Introduction beyond the dyad: Conceptualization of social networks. *Human Development*, 48, 5–7.

Londerville, S. & Main, M. (1981). Security of attachment, compliance and maternal training methods in the second year of life. *Developmental Psychology*, 17, 289–299.

Lyons-Ruth, K., Connell, D.B., Grunebaum, H.U. & Botein, S. (1990). Infants at social risk: Maternal depression and family support services as mediators of infant development and security of attachment. *Child Development*, 61(1), 85–98.

Mace, R. & Sear, R. (1997). Birth interval and the sex of children in a traditional African population: An evolutionary analysis. *Journal of Biosocial Science*, 29(4), 499–507.

Main, M. & Solomon, J. (1986). Discovery of an insecure-disorganized/disoriented attachment pattern. In T.B. Brazelton & M. Yogman (eds). *Affective Development in Infancy*. Westport, CT: Ablex Publishing, pp. 95–124.

Main, M. & Solomon, J. (1990). Procedures for identifying infants as disorganized/disoriented during the Ainsworth Strange Situation. In T.M. Greenberg, D. Cicchetti & E.M. Cummings (eds). *Attachment in the Preschool Years: Theory, Research and Intervention*. Chicago, IL: The University of Chicago Press, pp. 121–160.

Markus, H.R. & Kitayama, S. (1991). Culture and the self. Implications for cognition, emotion and motivation. *Psychological Review*, 98, 224–253.

Meehan, C.L. & Hawks, S. (2014). Maternal and allomaternal responsiveness: The significance of cooperative caregiving in attachment theory. In H. Otto & H. Keller (eds). *Different Faces of Attachment: Cultural Variations on a Universal Human Need*. New York, NY: University of Chicago Press, pp. 113–140.

Meins, E. (1999). Sensitivity, security and internal working models: Bridging the transmission gap. *Attachment and Human Development*, 1, 307–324.

Meins, E. & Fernyhough, C. (1999). Linguistic acquisitional style and mentalising development: The role of maternal mind-mindedness. *Cognitive Development*, 14, 363–380.

Meins, E., Fernyhough, C., Fradley, E. & Tuckey, M. (2001). Rethinking maternal sensitivity: Mothers' comments on infants' mental processes predict security of attachment at 12 months. *Journal of Child Psychology and Psychiatry*, 42(5), 637–648.

Morelli, G.A. & Tronick, E.Z. (1991). Parenting and child developments in the Efe foragers and Lese farmers of Zaire. In M.H. Bornstein (ed.). *Cultural Approaches to Parenting*. Hillsdale, NJ: Lawrence Erlbaum Associates, pp. 91–114.

Neckoway, R., Brownlee, K. & Castellan, B. (2007). Is attachment theory consistent with Aboriginal parenting realities? *First Peoples Child and Family Review*, 3(2), 65–74.

Otto, H. (2009). Culture-specific attachment strategies in the Cameroonian Nso: Cultural solutions to a universal developmental task. (Doctorial dissertation), University of Osnabrück

Otto, H. & Keller, H. (2014). *Different Faces of Attachment: Cultural Variation on a Universal Human Need*. Cambridge: Cambridge University Press.

Otto, H. & Keller, H. (2015). Is there something like German parenting? In G. Nicolas, A. Bejarano & D.L. Lee (eds). *Contemporary Parenting: A Global Perspective*. New York: Routledge, pp. 81–94.

Porges, S.W. (1997). Emotion: An evolutionary by-product of the neural regulation of the autonomic nervous systema. *Annals of the New York Academy of Sciences*, 807(1), 62–77.

Quinn, N. & Mageo, J.M. (2013). *Attachment Reconsidered: Cultural Perspectives on a Western Theory*. New York: Palgrave Macmillan.

Rothbaum, F., Rosen, K., Ujiie, T. & Uchida, N. (2002). Family systems theory, attachment theory, and culture. *Family Process*, 41, 330–352.

Scheper-Hughes, N. (2003). Culture, scarcity and maternal thinking. In M.G. Spinelli & M.G. Spinelli (eds). *Infanticide: Psychosocial and Legal Perspectives on Mothers Who Kill*. Washington, DC: American Psychiatric Publishing, Inc., pp. 119–130.

Schore, A.N. (2015). *Affect Regulation and the Origin of the Self: The Neurobiology of Emotional Development*. New York: Routledge.

Seymour, S. (2004). Multiple caretaking of infants and young children: An area in critical need of a feminist psychological anthropology. *Ethos, 32*(4), 538–556.

Sigel, I.E., McGillicuddy-DeLisi, A.V. & Goodnow, J.J. (2014). *Parental Belief Systems: The Psychological Consequences for Children*, 2 edn. New York: Psychology Press.

Spitz, R.A. (1965). *The First Year of Life*. New York: International University Press.

Super, C.M. & Harkness, S. (1986). The developmental niche: A conceptualization at the interface of child and culture. *International Journal of Behavioral Development*, 9(4), 545–569.

Takahashi, Y. (1990). Separation distress of Japanese infants in the strange situation. *Research and Clinical Center for Child Development*, 12, 141–150.

Thompson, R.A. (2000). The legacy of early attachments. *Child Development,* 71(1), 145–152.

Thompson, R.A. & Lagattuta, K.H. (2006). *Feeling and Understanding: Early Emotional Development*. Malden, MA: Blackwell Publishing.

Tomlinson, M. (2010). Family-centred HIV interventions: Lessons from the field of parental depression. *Journal of the International AIDS Society*, 13(2), 9–17.

Trivers, R.L. (1996). *Parental Investment and Sexual Selection*. Chicago, IL: University of Chicago Press.

True, M.M., Pisani, L. & Oumar, F. (2001). Infant–mother attachment among the Dogon of Mali. *Child Development*, 72(5), 1451–1466.

Van IJzendoorn, M.H. & Kroonenberg, P.M. (1988). Cross-cultural patterns of attachment: A meta-analysis of the Strange Situation. *Child development*, 59, 147–156.

Verhoef, H. (2005). 'A child has many mothers': Views of child fostering in northwestern Cameroon. *Childhood*, 12(3), 369–390.

Weisner, T.S. (1984). Ecocultural niches of middle childhood: A cross-cultural perspective. In W.A. Collins (ed.). *Development During Middle Childhood: The Years from Six to Twelve*. Washington, DC: National Academic Press.

Weisner, T.S., Bradley, C., Kilbride, P.L., Bradley, C. & Kilbride, P.L. (1997). *African Families and the Crisis of Social Change.* Westport, US: Bergin and Garvey.

Yovsi, R., Kaertner, J., Keller, H. & Lohaus, A. (2009). Maternal interactional quality in two cultural environments: German middle-class and Cameroonian rural mothers. *Journal of Cross-Cultural Psychology*, 40(4), 701–707.

Chapter 9

Planning and evaluating child mental health interventions in sub-Saharan Africa

Theresa Betancourt, Anne Stevenson, Sarah Meyers-Ohki & Christina Mushashi

Introduction

In sub-Saharan Africa, major forms of adversity such as armed conflict and the HIV/AIDS pandemic have increased threats to child survival and development, with significant consequences for mental health. In war-affected contexts, children not only experience direct harm and exposure to violence, but also suffer from damaged societal and contextual structures, including impoverished economies, weakened community and family structures, insufficient social services, and declines in basic health and security infrastructure.[1] Many of these sub-Saharan Africa settings have also been ravaged by HIV, with dire consequences for child health and development. As of 2013, sub-Saharan Africa accounted for 91 per cent of children aged 0–14 years living with HIV (2.9 million) and 71 per cent of people infected with HIV worldwide (24.7 million).[2]

Such adversities have broad effects on family functioning and, by extension, on the environment in which children grow and develop. In many conflict zones and HIV-affected settings, children may be orphaned or take on adult roles to help counteract limitations faced by their caregivers.[3] Young people may drop out of school to care for younger children or to help with family economic responsibilities. When family members are living with HIV, children may also have worries about their own health status, or may have misconceptions about how HIV is transmitted. These and other dynamics contribute to a higher risk of mental health problems in children.[4]

These mental health consequences have gained increasing attention in the literature on global public health.[5] However, there is limited information on the effectiveness

1 Ashby, 2002, p. 11; Betancourt et al., 2010, pp. 606–615; Betancourt et al., 2008, pp. 565–587; United Nations International Children's Emergency Fund (UNICEF), 2009; UNICEF, 2016.
2 Joint United Nations Programme on HIV/AIDS (UNAIDS), 2014.
3 Bachmann & Booysen, 2003, p. 14; Cluver & Orkin, 2009, pp. 1186–1193; Nampanya-Serpell, 2000.
4 Betancourt, Borisova et al, 2011, pp. 21–28; Cluver et al., 2008, pp. 410–417; Cluver et al., 2009, pp. 732–741; UNICEF, 2009.
5 Drew et al., 2011, pp. 1664–1675; Kieling et al., 2011, pp. 1515–1525; Lund et al., 2011,

of interventions for treating child and adolescent mental health in sub-Saharan Africa.[6] Challenges to developing interventions include the lack of appropriate and valid measurements of mental health problems and related constructs,[7] as well as the logistical challenges of working in settings with few trained mental health professionals and underdeveloped mental health services.[8] There is limited empirical research identifying the key aspects of effective intervention development and there is a dearth of information regarding the interventions that have proven most effective for addressing child mental health problems in these settings.[9] Moreover, ethical issues are also central to conducting child mental health research in resource-poor settings.[10]

These challenges are particularly salient in light of the Sustainable Development Goals (SDGs). The Global Strategy for Women's, Children's and Adolescents' Health stresses the importance of ensuring the health and well-being of children from birth through to adolescence.[11] To meet these goals, we must develop effective mental health interventions as well as accurate tools for monitoring and evaluation. To address the unique challenges of cross-cultural mental health research and intervention, and the agenda of the SDGs, new approaches must be developed. Importantly, in settings with limited human and material resources, these efforts must include sustainable partnerships to build local capacity.[12] This chapter argues for the application of a qualitative and quantitative 'mixed-methodology' to better understand the mental health issues facing war-affected children and families, and presents a model for planning and evaluating mental health services in diverse cultural settings. With the involvement of local research teams and advisers, such integrated approaches to assessment and intervention development and testing can help advance progress in the field and ensure that interventions are effective, sustainable and culturally sound.[13] Using an example from field research with children and families facing adversity due to HIV/AIDS in Rwanda, the authors illustrate how core research issues and challenges may be addressed in this and other sub-Saharan African settings.

pp. 1502–1514; Nagata et al., 2016, pp. 50–60; Tol et al., 2011, pp. 1581–1591.

6 Mollica et al., 2004, pp. 2058–2067.

7 Canino et al., 1997, pp. 163–184; Patrick & Chiang, 2000, pp. 14–25; Proctor et al., 2009, pp. 24–34.

8 Saraceno et al., 2007, pp. 1164–1174; Silove, 2004, pp. 90–96; World Health Organization (WHO), 2010.

9 Betancourt et al., 2013, pp. 70–91.

10 Betancourt, 2011, pp. 323–325; Betancourt et al., 2016.

11 United Nations (UN), 2015.

12 Patel et al., 2007, pp. 991–1005; Saraceno et al., 2007, pp. 1164–1174; WHO, 2010.

13 Collins et al., 2011, pp. 27–30; Patel et al., 2008, pp. 313–334.

The challenge of measurement with children in sub-Saharan Africa

Currently, a great deal of the research on children and families faced with adversity in sub-Saharan Africa begins with the design of a questionnaire or standard survey. Surveys may be used in pre- and post-intervention assessments to measure targeted outcomes, or to examine the distribution and determinants of certain mental disorders. While such approaches are commonly used, a number of challenges arise when this 'standard approach' is applied non-critically to culturally diverse populations.

First, surveys based on Western diagnostic systems may incorrectly specify clinically significant indicators of syndromes.[14] There is vast variation between Western contexts (where most surveys are developed) and the experiences, cultures, languages and diversity of sub-Saharan Africa. By failing to measure critical concepts or factors relevant to the study population, studies limit their cultural validity and generalisability.[15] Relatedly, most studies have limited space for new discovery and do not investigate local expressions of distress. As such, research may be overly focused on a preordained area of interest while overlooking issues of local importance.

Additionally, survey translation is fraught with difficulties in low-resource sub-Saharan Africa settings. In these contexts, it is often the case that English-speaking translators have had a different set of life experiences, and may have very different word usage and cognitive processing of foreign concepts compared to the larger, often very poor, community that may be the target of intervention. Translation by these individuals can result in semantic equivalence but may miss the mark in terms of real world significance.

The serious risk of such measurement errors is that evaluations may fail to accurately measure impact. They may indicate that a programme is successful when it truly is not, or an effective programme may be dismissed because measurement errors lead to a misrepresentation of true effectiveness. Given these issues, the adaptation of Western-developed surveys must be approached with care, from the inclusion of locally relevant indicators of distress to the adoption of appropriate translation techniques.[16]

The case for a mixed-methods approach to assessment

To address the concerns raised earlier, some investigators with experience in cross-cultural sub-Saharan African work have proposed a mixed-methods model

14 Canino & Alegria, 2008, pp. 237–250; De Jong & Van Ommeren, 2002, pp. 422–433; Guarnaccia et al., 2003, pp. 339–366; Lewis-Fernandez et al., 2002, pp. 199–223; Stichick, 2001, pp. 797–814.

15 Alegria et al., 2004, pp. 208–220; De Jong & Van Ommeren, 2002, pp. 422–433; Hollifield et al., 2002, pp. 611–621.

16 Betancourt, 2011, pp. 323–325.

which uses qualitative data as a starting point for deriving or adapting culturally appropriate quantitative assessments.[17] Qualitative methods, which adopt an *emic* or local perspective,[18] work from the 'inside' out and allow investigators to generate hypotheses informed by local needs.[19]

These hypotheses may be further refined by mixing qualitative methods. In this iterative process, prior study findings from a focus group or free-listing technique may feed into a series of in-depth, key informant interviews, which allow for deeper exploration and discovery. For example, in the authors' research on HIV-affected children in Rwanda, focus groups were used to identify processes and family dynamics, which led to better-than-expected outcomes (resilience). The most commonly described protective processes then formed the central focus of subsequent key informant interviews, which were used to identify specific indicators of each construct.[20] These data were used to complete an informed selection of appropriate assessments. Where no good fit was found between local perspectives on what contributes to resilience and standard measures of protective processes, qualitative data were used to develop new scales, as necessary.

Qualitative methods can also be used to investigate how subjects understand or interpret specific quantitative survey items. Additionally, once surveys have been completed, qualitative focus groups or key informant interviews can help to interpret or 'unpack' study results. Such collaborative learning between the study population and outside investigators is critical to ensure an insightful and accurate interpretation of mental health in any given setting. Additional insight may also be gleaned from local study staff and from other collaborators or stakeholders who have in-depth knowledge of local culture.

A mixed-methods model for planning and evaluating mental health services among diverse cultural groups

Taking the above arguments into account, Figure 9.1 presents a mixed-methods model for developing mental health measures and interventions, and evaluating their effectiveness among war-affected children. This work was supported by the National Institute of Mental Health (NIMH) as a part of a Career Development Award to the first author. In the first step of the model, qualitative methods are used to examine relevant mental health constructs (local idioms of distress and impairment, as well

17 Betancourt, 2013; Betancourt & Bolton, 2005; Bolton, 2001a, pp. 238–242; Mollica et al., 2004, pp. 2058–2067.
18 Geertz, 1973.
19 Maxwell & Delaney, 2000.
20 Betancourt, Meyers-Ohki et al., 2011, pp. 693–701.

as processes contributing to resilience) and explore protective processes that may be leveraged as 'active ingredients' of an intervention. Qualitative data collection also investigates functional limitations to intervention feasibility and sustainability, as well as service preferences of the population of interest.

In the model's second step, this information is used to select or create appropriate measures and intervention models. This step also includes processes to rigorously evaluate multiple forms of instrument validity,[21] including *face validity* (the degree to which the measurement or intervention appears relevant), *construct validity* (the degree to which the measure actually assesses what it purports to measure), *predictive validity* (documentation of the measure's ability to predict something it should theoretically be able to predict), *concurrent validity* (the degree to which the measure correlates with other measures of similar constructs), and *criterion validity* (the degree to which the measure agrees with an outside 'gold standard' for measuring the same construct). In situations where no appropriate 'gold standard' exists, alternate strategies to identify a reference point might be considered for examining the degree to which a measure captures likely mental health difficulties.[22]

In the third phase of the model, once a feasible intervention model has been identified and appropriate measures selected, adapted and validated, assessments are used to examine intervention effects using the most rigorous study designs possible, including randomised controlled designs. The model also extends to examine lessons learnt in the process of service delivery, through qualitative processes such as exit interviews with intervention participants and providers. Information gleaned from this qualitative follow-up helps to further refine and adapt the mixed-methods model, which is constantly evolving, given experiences from the field.

Benefits of a mixed-methods model in research in sub-Saharan Africa

The mixed-methods model addresses a number of issues inherent in cross-cultural research with children and youth. First, it works to preserve the ethical integrity of research projects by using the community's self-identified needs to guide measurement and intervention development.[23] This issue is particularly salient given the tendency of researchers to impose their own service preferences or bias on research aims.

21 Goldstein & Simpson, 1995, pp. 229–242.
22 Betancourt, Bass et al., 2009, pp. 685–692; Bolton & Tang, 2002, pp. 537–543.
23 Trickett & Espino, 2004, pp. 1–69.

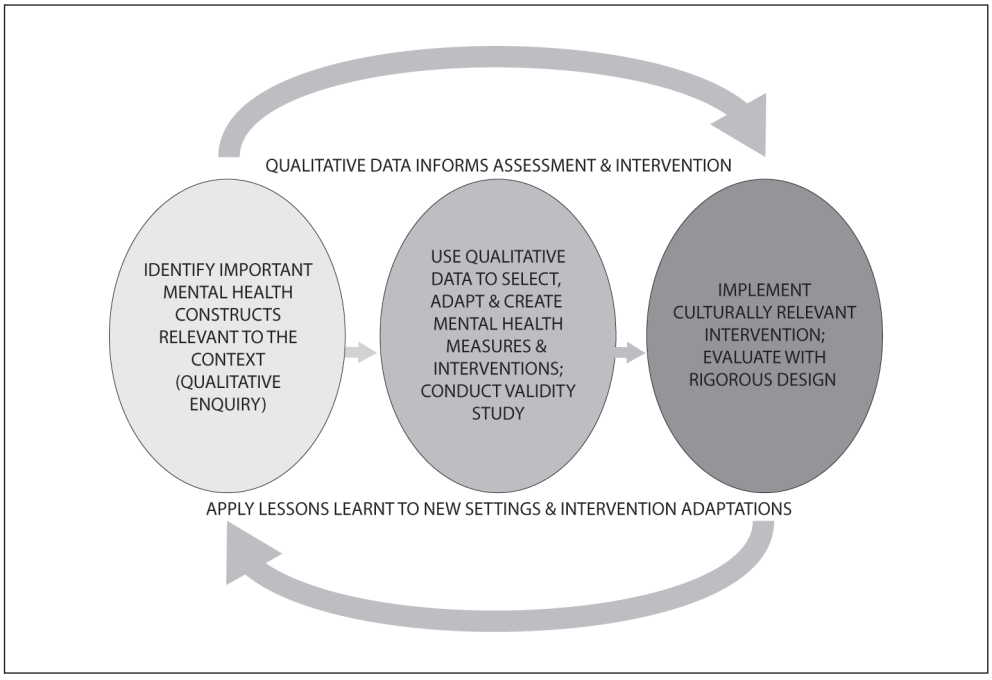

Figure 9.1. A mixed-methods model for planning and evaluating mental health services in diverse cultural settings

Source: Betancourt, Meyers-Okhi et al., 2011

Second, the model incorporates high levels of community participation through qualitative inquiry, local partnerships and community advisory boards. Community participation increases the likelihood that interventions are acceptable and suitable to the culture—issues which, in turn, increase the potential for scale-up and sustainability, as well as community buy-in[24]—and ensures that avenues for dissemination back into the community exist throughout the lifetime of a study.[25] Additionally, community participants and advisers assist in advertising the research study and aims, and can help to ensure that potential participants are duly informed of their rights and of study risks.

Third, measures informed by qualitative data receive several rounds of appraisal by study staff (through an in-depth translation process) and through pretesting or 'cognitive testing'. Throughout, measures are evaluated for the degree of abstractness inherent in a survey item or scale, as well as for problematic concepts and problems like double negatives. This iterative process of refinement is very important in

24 Israel et al., 1998, pp. 173–202; Israel et al., 2003.
25 Wells et al., 2004, pp. 955–963.

low-resource settings, where survey participants may not be literate and respond to questions read aloud by study staff.

Example from the field

In the following section, a description of the authors' research in Rwanda is presented to illustrate how the mixed-methods model is implemented through all three stages. Examples of challenges from the field are used to highlight the Rwandan project's best practices, and may be used to inform future applications of mixed-methods in sub-Saharan Africa.

Brief background on the Family Strengthening Intervention in Rwanda

The Rwandan context

The lives of Rwandan children and families have been radically altered by HIV/AIDS and by the legacy of the genocide against the Tutsi in 1994. Research in other countries has shown that HIV-affected families are at heightened risk of conflict, economic insecurity and poor mental health,[26] and studies have documented that Rwandan genocide survivors are prone to mental health problems.[27] One study associated positive HIV serostatus with higher rates of depression in female genocide survivors, and showed that this phenomenon may be further compounded by poverty and intimate partner violence.[28] Epidemiological studies in Rwanda have provided evidence of widespread depression among men and women nationwide.[29] Parental death due to AIDS and violence has left the country with a young population in need of basic services and mental health care.[30]

HIV-affected and trauma-affected Rwandans face hardships which extend from the individual to the family and community realms, reflecting the long-standing ecological theory put forth by Bronfenbrenner (1979).[31] Bronfenbrenner divides the realm of development into five different ecological systems (microsystem, mesosystem, exosystem, macrosystem and chronosystem) that reflect the interactions between individuals, their family units, their societies and the experiences which link these

26 Boyes & Cluver, 2015, pp. 847–859; Doku, 2009, p. 26; Lester et al., 2006, pp. 81–101; Murphy et al., 2006, pp. 386–395; Murphy et al., 2012, pp. 313–318.
27 De Jong et al., 2000, pp. 171–177; Neugebauer et al., 2009, pp. 1033–1045; Schaal & Elbert, 2006, pp. 95–105.
28 Cohen et al, 2009, pp. 1783–1791.
29 Bolton et al., 2002, pp. 631–637; Dyregrov et al., 2000, pp. 3–21.
30 Bauman et al., 2006, pp. 56–70; Boris et al., 2008, pp. 836–843; Boris et al., 2006, pp. 584–602.
31 Bronfenbrenner, 1979.

together in interconnected ways. The interrelatedness of these spheres in Rwandan culture has been underscored by the few existing qualitative studies of mental health constructs and protective processes in this country.[32] However, while researchers and service providers have recognised the prevalence and complex causes of mental health problems among this population, few guidelines for concrete pathways to recovery have been disseminated.[33]

Study overview

Although little work on evidence-based mental health interventions has been conducted in Rwanda, there is strong political will at the governmental level to improve mental health services for children and families. Additionally, as Rwanda's Ministry of Health (MOH) works to improve clinical services for treating HIV/AIDS and other chronic illnesses, families come into more regular contact with a range of health providers. As such, Rwanda presents a rare opportunity for developing and evaluating a culturally informed mental health intervention to address multiple forms of family adversity, with high potential for integration within a standard package of care. Further, such an intervention may have broad public health applications in other countries in sub-Saharan Africa.

In 2007, the principal investigator (first author) founded a collaborative mixed-methods research project between the Harvard T.H. Chan School of Public Health (HSPH) and Partners In Health/Inshuti Mu Buzima (PIH/IMB). PIH is a global organisation whose mission is to combat disease and poverty using community-based care in low-resource settings. Launched in 2005, IMB was the first PIH project in Africa, and was built to combat the twin pandemics of poverty and disease. In close partnership with the government, IMB works to support the MOH to comprehensively strengthen the public health system in rural, underserved areas of the country.

Phase 1: Qualitative inquiry into mental health problems and protective processes in Rwanda

Methods

In 2007, a first qualitative study explored local perceptions of mental health problems facing HIV-affected youth in Rwinkwavu, Rwanda. The study used a rapid qualitative assessment approach employed in previous cross-cultural mental health research in sub-Saharan Africa.[34] Children (aged 10–17 years) (n=71) and their caregivers

32 Bagilishya, 2000, p. 337; Betancourt, Meyers-Ohki et al., 2011, pp. 693–701; Betancourt, Rubin-Smith et al., 2011, pp. 401–412; Bolton, 2001b, pp. 243–248; De Jong et al., 2000, pp. 171–177; Pham et al., 2004, pp. 602–612; Zraly & Nyirazinyoye, 2010, pp. 1656–1664.

33 Brown et al., 2005; Schaal et al., 2009, 298–306; Zraly et al., 2011, pp. 257–270.

34 Betancourt, Bass et al., 2009, pp. 685–692; Betancourt, Speelman et al., 2009, pp. 238–256; Bolton,

(n=57) were interviewed using free listing and key informant methods. All interviews and data analyses were conducted in Kinyarwanda (the local language) with close collaboration between Rwandan research assistants and the academic team. Observations of children and caregivers were documented from the participants' point(s) of view, using their own concepts and terminology.

In 2009, a second qualitative study was completed to identify strengths and sources of resilience in individuals and families at risk for mental health difficulties identified during the prior study. Maximum variation sampling was used to complete free-listing exercises (n=21), key informant interviews (n=68) and focus groups (n=9 groups).

Participants

Participants in free list exercises were drawn from hospital waiting areas at PIH/IMB. Focus groups were composed of HIV-affected family members and were separated by gender and by age (caregivers; children aged 10–13 years; children aged 14–17 years). Additional focus groups were held with community health workers, *accompagnateurs* (community health workers with a specific focus on HIV/AIDS), social workers, mental health staff and paediatric doctors who interact regularly with HIV-affected families. Key informants were community members and health professionals identified as having particular knowledge about mental health syndromes in children and resilience in families; many, but not all, were HIV-affected. Key informants were nominated by PIH/IMB staff and by focus group participants; additional key informants were identified via snowball sampling.

Findings

Thematic content analysis (TCA) was employed to distil and classify important indicators of core constructs. The research identified several categories of locally defined syndromes indicative of the mental health needs of children in this setting.[35] *Guhangayika* (mixed anxiety and depression-like problems) was explained as quite common among HIV-affected children and adolescents. When left untreated, *guhangayika* can develop into *agahinda kenshi* (persistent sorrow). *Kwiheba* (hopelessness and suicidal ideation) was described as an even more serious manifestation of mental health problems in youth. Problems such as *umushiha* (constant irritability/anger) and *uburara* (delinquent and high-risk behaviour) were described as feeding a cycle of social withdrawal and isolation. Some participants also discussed *ihahamuka,* a term describing the consequences of extreme trauma related to the genocide or the diagnosis of HIV.[36]

2001, pp. 238–242.

35 Betancourt, Rubin-Smith et al., 2011, pp. 401–412.

36 Betancourt, Rubin-Smith et al., 2011, pp. 401–412.

Additionally, several local protective processes (i.e., strengths that help to prevent and mitigate the above problems) were identified.[37] These included individual factors such as *kwihangana* (perseverance/coping) and *kwigirira ikizere* (self-esteem/self-confidence), which were thought to be fostered by family factors such as *kwizerana* (family connectedness) and *uburere bwiza* (good parenting), and by larger community factors such as *ubufasha abaturage batanga* (social support).[38]

Phase 2: Using qualitative findings to inform mental health assessments and intervention adaptation

Measures selection

Research team members—both US and field-based—worked collaboratively with local Rwandan research assistants (RAs) to review existing standardised measures designed to assess Western DSM-IV criteria. An extensive search of the literature was performed for each of the six mental health problems and five protective processes. Search criteria for potential measures included prior cross-cultural application with children and prior use with good psychometric properties when adapted to low-resource, low-literacy settings.

Fifty-five potential measures were found for the six syndromes; 36 potential measures were found for the five protective resources. The research team compared the scale items of each standardised measure to the symptom/indicator list for the corresponding local syndrome/protective construct. Each item was discussed to ensure that both native-Kinyarwanda and native-English speakers understood the concepts being measured. Conceptually equivalent items were then identified. The number of local symptoms measured by the standardised scale was divided by the total number of symptoms to generate a per cent match. Any measure scoring less than 50 per cent was dismissed from consideration. Scales were also evaluated for their generalisability (e.g., the Revised Fear Survey Schedule for Children[39] was judged to contain too many culturally inappropriate items, such as 'roller coaster or carnival rides' or 'flying on an airplane'). During the final stages of measures selection, a local psychologist familiar with mental health instruments reviewed the measures matching for accuracy and thoroughness.

Translation

Selected measures were translated from the 'source language' (English) to the 'target language' (Kinyarwanda) according to a protocol informed by current literature.[40]

37 Betancourt, Meyers-Ohki et al., 2011, pp. 693–701.
38 Betancourt, Meyers-Ohki et al., 2011, pp. 693–701; Scorza et al., 2017.
39 Ollendick, 1983, pp. 685–692.
40 Beaton et al., 2000, pp. 3186–3191; Brislin, 1970, pp. 158–216; Brislin et al., 1973; Da Mota Falcão

During this process, colloquial English terms were replaced with equivalent local idioms. Efforts were made to achieve semantic and content equivalence prior to the addition of any new culture-specific items (outside of those driven by semantics).

In the first step of translation, two native speakers of the target language worked independently to forward-translate measures from source language to target language. Translators were asked to integrate the findings on local constructs of relevance and their indicators using information gained from the free listing and key informant interview methods. In addition, investigators discussed the matching process with translators to elucidate why certain qualitatively derived symptoms were considered conceptually equivalent to their matched survey items.

Translators were then provided with English versions of the standardised measures. Where possible, survey items were modified to include parenthetical reminders of the conceptually equivalent, qualitatively derived Kinyarwanda symptom terms. Translators were instructed to incorporate this vocabulary where possible. For example, qualitative analyses identified *aracecetse* ('is quiet') as a common symptom of *agahinda kenshi*. This symptom was subsequently considered to be conceptually linked to the Center for Epidemiological Studies Depression Scale for Children (CES-DC) item 'I was more quiet than usual'.[41] The English-language CES-DC provided to translators was then rewritten to read: 'I was more quiet than usual (*aracecetse*)'. In effect, this process allowed translators to easily locate conceptually equivalent terms while retaining the local language distilled from qualitative data.

To retain colloquialisms specific to the Rwinkwavu area, the local research team offered recommendations as needed. When translators disagreed with suggested terms, the research team reviewed the qualitative transcripts to determine alternatives that expressed the same concept. In some cases, standardised measures used two very similar terms to describe a single concept (e.g., 'I feel sad and blue'). To retain consistency in these instances, the research team and translators identified two commonly used and conceptually equivalent items from the qualitative data; both were then used in the forward translation.

The two resulting translated documents were then back-translated by an independent, bilingual reviewer whose native language was English. An expert committee, composed of all three translators and a final bilingual adjudicator (who was knowledgeable of clinical terms, a native speaker of the target language and familiar with the study population), assembled to examine the instrument's cultural acceptability, resolve discrepancies among translations, correct any problems with clarity, comprehension or language, and synthesise the two translations to produce the

et al., 2003, p. 379; Douglas & Craig, 2007, pp. 30–43; Guillemin, 1995, pp. 61–63; Hambleton, 2001, pp. 164–172; Pan & De la Puente, 2005, p. 6; Perneger et al., 1999, pp. 1037–1046; Van Widenfelt et al., 2005, pp. 135–147; Weisz et al., 1987, p. 890; WHO, 2007.

41 Faulstich et al., 1986, pp. 1024–1027; Fendrich et al., 1990, pp. 538–551.

measure in its final form. All translated measures employed response categories and instructions that corresponded to the original instrument. This rigorous translation process was completed to provide the research team with conceptually equivalent baseline versions of the standardised measure in both languages.[42]

Example 1: Issues in translation

> In several instances, the conceptual equivalence between local symptom and survey item was counteracted by semantic incongruence. To preserve the integrity of the standardised instrument, the original survey item was translated verbatim and the locally derived term was included as a prompt to be used in cases of poor comprehension. For example, the local *umushiha* symptom, 'Doesn't want to interact', was matched to an item on the Irritability Questionnaire (IRQ) that reads, 'At times I can't bear to be around people.'[43] While the research team felt that these statements portrayed the same underlying concept of antisocial tendencies, methodology dictated that the original IRQ phrasing be retained, and the qualitative item, 'At times I don't want to interact', be included as an alternate descriptor.

Addition of new items

Following translation, culture-specific additions were made to improve the sensitivity and relevance of the selected instruments. New items to measure context-specific symptoms conformed to the structure, tense and response format of original versions. These additions were placed at the end of the measure and arranged to create a flow, building from less intense items to more intense items (such as those about suicidal ideation) and ending with less difficult questions.

Development of new scales

When no Rwanda–Western parallel was observed, new measures were developed. To develop a measure for *uburara, kwizerana* and *uburere bwiza*, specific items were created to correspond to each of the construct's indicators. To retain consistency with the study's standardised scales, similar reporting timelines (i.e., 'last two weeks', 'last month', etc.) were used on locally derived measures. These were reviewed with a local consulting psychologist to ensure that they were appropriate for manifestations of psychopathology, as well as acceptable and comprehensible to local respondents.

Pretesting or 'cognitive testing' measures

Each of the instruments (adapted and new) was cognitive tested separately in two rounds with small samples of n=3 to 5 (total n=130 children and adults). Participants were asked if they understood each item, as well as the instructions. RAs probed

42 Harkness et al., 2004.

43 Craig et al., 2008, pp. 367–375.

to understand what participants thought the question was asking and how each participant selected his/her response. RAs also attended to any issues with sensitivity of the questions or poor comprehension of the domains assessed. A structured worksheet provided space for RAs to transcribe the child's response verbatim. These notes were translated by the interviewing RA on the day following the interview.

After each measure was tested for the first time, the principal investigator and study team convened to review the notes and discuss items requiring revision. Modifications were implemented to maximise comprehensibility and equivalence. As a rule, the response format of Likert scales and reporting timelines was not changed unless cognitive testing indicated poor comprehension. A second sample of participants was then convened for an additional round of cognitive testing. Across all measures, no further discrepancies were indicated during the second round of testing. Parent report versions of the syndrome measures were cognitive tested among caregivers to ensure that sensitive topics were clearly and sensitively conveyed; however, protective measures were not tested among adults, as the child results indicated that these surveys were largely comprehensible.

Once cognitive testing indicated that all measures were performing well, the entire pilot assessment battery was administered to a small sample of children (n=9) and their caregivers (n=9). The survey was delivered in a manner intended to replicate ordinary test conditions. RAs were instructed to monitor the overall length of the battery and issues of child fatigue or lack of concentration.

Example 2. Examples of misunderstood or culturally irrelevant questions

> Several items performed poorly during the initial testing phase. For instance, probing revealed that most positive responses to questions about psychosomatic symptoms (e.g., 'I felt hungrier than usual') were linked to issues such as malnutrition or chronic illness. Other items contained problematic or non-contextualised vocabulary (e.g., 'I feel like a bomb ready to explode'). Items that were too long or that had a complicated reporting timeline were also problematic (e.g., 'I was bothered by things that usually don't bother me').
>
> For items such as 'I felt hungrier than usual', qualifiers such as 'even when I had enough to eat' were used to help make the question more targeted and context-appropriate. Alternate phrasings for problematic vocabulary were discussed and selected by the research team following cognitive testing; e.g., 'I feel like a bomb ready to explode' was rephrased to 'I feel angry, like my heart is ready to explode'. Complicated reporting timelines and double negatives were also reworked; e.g., 'I was bothered by things that usually don't bother me' was revised to read, 'I was bothered by things that I used to consider usual or simple'.

Reliability testing

Measures were evaluated for test–retest and inter-rater reliability among children (n=36) and caregivers (n=36). Baseline interviews were conducted with the full sample. To examine test–retest reliability, the entire sample was reinterviewed one

to three days after the initial interview. Two-thirds of these participants completed their reinterview with a different RA to provide data on inter-rater reliability. Test–retest and inter-rater reliability were assessed using Pearson's correlation coefficients; all but one measure showed acceptable scores (above 0.7). For this one measure, item analysis indicated that the problem lay with a single question, indicating that the measure performed well overall. Instrument internal reliability was assessed using Cronbach's alpha coefficients, which also demonstrated good psychometric properties (alpha ≥ 0.70).

Validity testing

In a separate phase of testing, local community advisers generated lists of children (aged 10–17 years) thought to have at least one of the local mental health syndromes, and a list of children thought to have none of these syndromes. RAs, blinded to the possible syndrome status of the child, administered the entire battery of mental health measures to each participant. Children and caregivers also reported (via a simple yes/no response) whether they thought the child participant had experienced any of the constructs. Then, in a separate interview, a mental health clinician interviewed each child participant using relevant disorder modules from the Mini International Neuropsychiatric Interview for Children and Adolescents (MINI-Kid), a structured diagnostic interview which maps onto DSM-IV criteria.[44] In making comparisons to the MINI-Kid, those rated per the assessment were deemed as likely 'cases'. Scores on the measures of psychopathology compared likely 'cases' to likely 'non-cases'. Patterns of agreement between this 'gold standard assessment', scores on the administered mental health measures, and child/caregiver 'yes/no' self-reports, were evaluated using t-tests, kappa for diagnosis, and receiver operating characteristic (ROC) analyses for sensitivity and specificity. These were used to determine clinical thresholds for scores indicating a likely presence of mental disorder in Rwandan children.[45]

Phase 3: Implementation and evaluation of the Family Strengthening Intervention

During Phase 2, preparations of a culturally appropriate intervention were also underway.[46] Qualitative data on sources of strengths in children and families facing adversity (gathered during Phase 1) highlighted resources that naturally promote good adjustment and prevent mental health problems.[47] In particular, strong conceptual links emerged between children, family communication, good parenting,

44 Sheehan et al., 2009.
45 Betancourt, Meyers-Okhi et al., 2012, pp. 113–142.
46 Betancourt, Meyers-Ohki et al., 2012, pp. 113–142.
47 Betancourt, Meyers-Okhi et al., 2011, pp. 693–701.

mutual understanding related to illness and adversities, connectedness, and better navigation of formal and non-formal resources and support networks. These results were shared with community advisers, who reinforced the salience of findings and helped to identify Rwandan proverbs, songs and practices that are useful in fostering family functioning and emotional and behavioural health.

A prevention-oriented intervention was selected, given current theory on the nature of stress-adjustment, which holds that changes in life events such as HIV contraction create stress which, if mismanaged, can lead to mental health problems. However, when stressors are managed well through appropriate use of individual, family and community resources, the likelihood of mental health problems may be reduced. In resource-poor settings like Rwanda, prevention deserves particular attention, since treatment of mental health disorders is costly and largely ineffective. Additionally, interventions that strengthen entire families increase the likelihood that children will go on to thrive, despite adversity, and thereby reduce the risk of mental health problems in children and adolescents.

Brief description of the intervention

In this study, the Family-based Preventive Intervention[48] was adapted to the Rwandan context. The Family-based Preventive Intervention was chosen for its central focus on galvanising natural mechanisms of resilience in children and families. It attends to the reality that chronic illness is a family issue, and uses 'family talk' to show that many resources exist to help families succeed, despite illness. The Family-based Preventive Intervention had been previously adapted to varied cultural contexts and implemented to good effect.[49]

In the Rwanda adaptation—the Family Strengthening Intervention—interventionists helped participants build a 'family narrative' or timeline to highlight sources of resilience that had assisted families in the past and to reinforce goals that the family had for the future.[50] Woven into this intervention were activities to build parenting skills, improve family communication, provide psycho-education on HIV and trauma, and strengthen problem-solving skills. Much of the vocabulary was drawn directly from the qualitative work of Phase I.

Evaluating intervention effectiveness using validated measures

During intervention evaluation, the culturally informed, locally validated mental health battery was used to assess mental health at baseline and at subsequent

48 Beardslee et al., 2006.

49 Beardslee et al., 2003, pp. 119–131; Beardslee et al., 2006; Beardslee et al., 1997, pp. 510–515; D'Angelo et al., 2009, pp. 269–291; Podorefsky et al., 2001, pp. 879–886.

50 Betancourt, Meyers-Ohki et al., 2012, pp. 113–142.

follow-ups. Primary outcomes included increases in locally important protective processes and prevention of mental health problems (or maintenance of below-threshold levels). Given that measures used local terms to quantify mental health constructs and were validated for use with the same population that was receiving services, results were likely more reliable and reflective of the dynamics in Rwanda.

Evaluating intervention feasibility, acceptability and sustainability

In addition to using quantitative measures of intervention effectiveness, the Family Strengthening Intervention surveyed participants and interventionists for feedback on the programme's cultural acceptability and feasibility, and on their own satisfaction. Evaluation of this data informed protocol modifications to ensure broad public health relevance. In particular, information on sustainable methods for integrating the Family Strengthening Intervention into standard services was sought. This process completes the full mixed-methods cycle by providing iterative qualitative feedback to inform research and intervention tools.

Summary and conclusion

As illustrated by the example from Rwanda, the mixed-methods model ensures that research advances through multiple rigorous, ethically sound steps. Experiences applying the model in Rwanda and other sub-Saharan Africa settings, including Ethiopia, Uganda and Sierra Leone, have highlighted some of the challenges and solutions to performing mixed-methods research in low-resource settings. Best practices for approaching these challenges are reflected in the Rwandan field work.

As shown throughout this chapter, ethical and technical issues can be addressed through participatory study design and attention to important translation and measurement issues. Overall, the mixed-methods model discussed here may be applied to research in other parts of sub-Saharan Africa and beyond, with the ultimate goal of improving assessments and interventions for children, youth and families affected by adversity globally, with the ultimate goal of achieving the SDGs. Importantly, the model ensures that data collection and analysis are conducted in consultation with staff, local experts and community advisers, and that findings are rooted in an *emic* approach. This model urges investigators to develop a deep understanding of the culture they are working in, and of the particular needs and problems of that community. To do this work well, one must develop long-term collaborations with the communities in which the research is conducted. Mental health measurement and interventions informed by such a collaborative and locally informed process are likely to be more responsive and sensitive to the service population.

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References

Alegria, M., Takeuchi, D., Canino, G., Duan, N., Shrout, P., Meng, X.L., … Gong, F. (2004). Considering context, place and culture: The National Latino and Asian American Study. *International Journal of Methods in Psychiatric Research*, 13(4), 208–220.

Ashby, P. (2002). Child combatants: A soldier's perspective. *The Lancet*, 360(9350), 11.

Bachmann, M.O. & Booysen, F.L. (2003). Health and economic impact of HIV/AIDS on South African households: A cohort study. *BMC Public Health*, 3, 14.

Bagilishya, D. (2000). Mourning and recovery from trauma: In Rwanda, tears flow within. *Transcultural Psychiatry*, 37(3), 337.

Bauman, L.J., Foster, G., Silver, E.J., Berman, R., Gamble, I. & Muchaneta, L. (2006). Children caring for their ill parents with HIV/AIDS. *Vulnerable Children and Youth Studies*, 1(1), 56–70.

Beardslee, W.R. (1998). Prevention and the clinical encounter. *American Journal of Orthopsychiatry*, 68(4), 521–533.

Beardslee, W.R., Gladstone, T.R., Wright, E.J. & Cooper, A.B. (2003). A family-based approach to the prevention of depressive symptoms in children at risk: Evidence of parental and child change. *Pediatrics*, 112(2), e119–131.

Beardslee, W.R., Hosman, C., Solantaus, T., Van Doesum, K. & Cowling, V. (2006). Supporting children and families of mentally ill parents: Preventing transgenerational transfer of mental disorders. In C. Hosman, E. Jane-Llopis & S. Saxena (eds). *Evidence-based Prevention of Mental Disorders*. Oxford: Oxford University Press.

Beardslee, W.R., Salt, P., Versage, E.M., Gladstone, T.R., Wright, E.J. & Rothberg, P.C. (1997). Sustained change in parents receiving preventive interventions for families with depression. *The American Journal of Psychiatry*, 154(4), 510–515.

Beaton, D., Bombardier, C., Guillemin, F. & Ferraz, M. (2000). Recommendations for the cross-cultural adaptation of health status measures. *Spine*, 25, 3186–3191.

Betancourt, T.S. (2011). Attending to the mental health of war-affected children: The need for longitudinal and developmental research perspectives. *Journal of the American Academy of Child and Adolescent Psychiatry*, 50(4), 323–325.

Betancourt, T.S. (2013). Using mixed methods to plan and evaluate mental health programs for war-affected children in Sub-Saharan Africa. In A. Kleinman & E. Akyeampong (eds). *The Culture of Mental Illness and Psychiatric Practice in Africa*. Bloomington, IN: Indiana University Press.

Betancourt, T.S., Bass, J., Borisova, I., Neugebauer, R., Speelman, L., Onyango, G., … Bolton, P. (2009). Assessing local instrument reliability and validity: A field-based example from northern Uganda. *Social Psychiatry and Psychiatric Epidemiology*, 44(8), 685–692.

Betancourt, T.S. & Bolton, P. (2005). Using qualitative methods to develop a locally-derived measure of psychosocial problems in Acholi war-affected children. Unpublished report to World Vision Uganda:

Betancourt, T.S., Borisova, I., De la Soudière, M. & Williamson, J. (2011). Sierra Leone's child soldiers: War exposures and mental health problems by gender. *Journal of Adolescent Health*, 49(1), 21–28.

Betancourt, T.S., Brennan, R.T., Rubin-Smith, J., Fitzmaurice, G.M. & Gilman, S.E. (2010). Sierra Leone's former child soldiers: A longitudinal study of risk, protective factors, and mental health. *Journal of the American Academy of Child and Adolescent Psychiatry*, 49(6), 606–615.

Betancourt, T.S., Meyers-Ohki, S.E., Charrow, A.P. & Tol, W.A. (2013). Interventions for children affected by war: An ecological perspective on psychosocial support and mental health care. *Harvard Review of Psychiatry*, 21(2), 70–91.

Betancourt, T.S., Meyers-Ohki, S., Stulac, S.N., Barrera, A.E., Mushashi, C. & Beardslee, W.R. (2011). Nothing can defeat combined hands (Abashize hamwe ntakibananira): Protective processes and resilience in Rwandan children and families affected by HIV/AIDS. *Social Science and Medicine*, 73(5), 693–701.

Betancourt, T.S., Meyers-Ohki, S.E., Stulac, S., Barrera, A.E., Mushashi, C. & Beardslee, W.R. (2012). Global mental health programs for children and families facing adversity: Development of a family strengthening intervention in Rwanda. In J.N. Corbin (ed.). *Children and Families Affected by Armed Conflicts in Africa: Implications and Strategies for Helping Professionals in the United State*s. Washington, DC: National Association of Social Workers Press, pp. 113–142.

Betancourt, T.S., Rubin-Smith, J., Beardslee, W.R., Stulac, S.N., Fayida, I. & Safren, S.A. (2011). Understanding locally, culturally, and contextually relevant mental health problems among Rwandan children and adolescents affected by HIV/AIDS. *AIDS Care*, 23(4), 401–412.

Betancourt, T.S., Scorza, P., Meyers-Ohki, S., Mushashi, C., Kayiteshonga, Y., Binagwaho, A. & Beardslee, W.R. (2012). Validating the center for epidemiological studies depression scale for children in Rwanda. *Journal of American Academy of Child Adolescent Psychiatry*, 51(12), 1284–1292.

Betancourt, T.S., Simmons, S., Borisova, I., Brewer, S.E., Iweala, U. & De la Soudière, M. (2008). High hopes, grim reality: Reintegration and the education of former child soldiers in Sierra Leone. *Comparative Education Review*, 52(4), 565–587.

Betancourt, T.S., Smith Fawzi, M.C., Stevenson, A., Kanyanganzi, F., Kirk, C., Ng, L., … Binagwaho, A. (2016). Ethics in community-based research with vulnerable children: Perspectives from Rwanda. *PLOS ONE*, 11(6), e0157042.

Betancourt, T.S., Speelman, L., Onyango, G. & Bolton, P. (2009). A qualitative study of mental health problems among children displaced by war in northern Uganda. *Journal of Transcultural Psychiatry*, 46(2), 238–256.

Bolton, P. (2001a). Cross-cultural validity and reliability testing of a standard psychiatric assessment instrument without a gold standard. *Journal of Nervous and Mental Disease*, 189(4), 238–242.

Bolton, P. (2001b). Local perceptions of the mental health effects of the Rwandan genocide. *Journal of Nervous and Mental Disease*, 189(4), 243–248.

Bolton, P., Neugebauer, R. & Ndogoni, L. (2002). Prevalence of depression in rural Rwanda based on symptom and functional criteria. *Journal of Nervous and Mental Disease*, 190(9), 631–637.

Bolton, P. & Tang, A.M. (2002). An alternative approach to cross-cultural function assessment. *Social Psychiatry and Psychiatric Epidemiology*, 37(11), 537–543.

Boris, N.W., Brown, L.A., Thurman, T.R., Rice, J.C., Snider, L.M., Ntaganira, J. & Nyirazinyoye, L.N. (2008). Depressive symptoms in youth heads of household in Rwanda: Correlates and implications for intervention. *Archives of Pediatrics and Adolescent Medicine*, 162(9), 836–843.

Boris, N.W., Thurman, T.R., Snider, L., Spencer, E. & Brown, L. (2006). Infants and young children living in youth-headed households in Rwanda: Implications of emerging data. *Infant Mental Health Journal*, 27(6), 584–602.

Boyes, M.E. & Cluver, L.D. (2015). Relationships between familial HIV/AIDS and symptoms of anxiety and depression: The mediating effect of bullying victimization in a prospective sample of South African children and adolescents. *Journal of Youth and Adolescence*, 44(4), 847–859.

Brislin, R.W. (1970). Back-translation for cross-cultural research. *Journal of Cross-Cultural Psychology*, 1(3), 158–216.

Brislin, R.W., Lonner, W.J. & Thorndike, R.M. (1973). *Cross-cultural Research Methods*. New York: John Wiley.

Bronfenbrenner, U. (1979). *The Ecology of Human Development: Experiments by Nature and Design*. Cambridge, MA: Harvard University Press.

Brown, L.K., Thurman, T.R. & Snider, L. (2005). Strengthening the psychosocial well-being of youth-headed households in Rwanda: Baseline findings from an intervention trial. *Horizons Research Update*. Washington, D.C: Population Council.

Canino, G. & Alegria, M. (2008). Psychiatric diagnosis: Is it universal or relative to culture? *Journal of Child Psychology and Psychiatry*, 49(3), 237–250.

Canino, G., Lewis-Fernandez, R. & Bravo, M. (1997). Methodological challenges in cross-cultural mental health research. *Transcultural Psychiatry*, 34(2), 163–184.

Cluver, L., Gardner, F. & Operario, D. (2008). Effects of stigma on the mental health of adolescents orphaned by AIDS. *Journal of Adolescent Health*, 42(4), 410–417.

Cluver, L., Gardner, F. & Operario, D. (2009). Poverty and psychological health among AIDS-orphaned children in Cape Town, South Africa. *AIDS Care*, 21, 732–741.

Cluver, L. & Orkin, M. (2009). Cumulative risk and AIDS-orphanhood: Interactions of stigma, bullying and poverty on child mental health in South Africa. *Social Science and Medicine*, 69(8), 1186–1193.

Cohen, M.H., Fabri, M., Cai, X., Shi, Q., Hoover, D.R., Binagwaho, A., … Anastos, K. (2009). Prevalence and predictors of posttraumatic stress disorder and depression in HIV-infected and at-risk Rwandan women. *Journal of Women's Health*, 18(11), 1783–1791.

Collins, P.Y., Patel, V., Joestl, S.S., March, D., Insel, T.R. & Daar, A.S. (2011). Grand challenges in global mental health. *Nature*, 472(7 July), 27–30.

Craig, K.J., Hietanen, H., Markova, I.S. & Berrios, G.E. (2008). The Irritability Questionnaire: A new scale for the measure of irritability. *Psychiatry Research*, 159, 367–375.

D'Angelo, E.J., Llerena-Quinn, R., Shapiro, R., Colon, F., Rodriguez, P., Gallagher, K. & Beardslee, W.R. (2009). Adaptation of the preventive intervention program for depression for use with predominantly low-income Latino families. *Family Process*, 48, 269–291.

Da Mota Falcão, D., Ciconelli, R. & Ferraz, M. (2003). Translation and cultural adaptation of quality of life questionnaires: An evaluation of methodology. *The Journal of Rheumatology*, 30(2), 379.

De Jong, J.T., Scholte, W.F., Koeter, M.W. & Hart, A.A. (2000). The prevalence of mental health problems in Rwandan and Burundese refugee camps. *Acta Psychiatrica Scandinavica*, 102(3), 171–177.

De Jong, J.T. & Van Ommeren, M. (2002). Toward a culture-informed epidemiology: Combining qualitative and quantitative research in transcultural contexts. *Transcultural Psychiatry*, 39(4), 422–433.

Doku, P. (2009). Parental HIV/AIDS status and death, and children's psychological wellbeing. *International Journal of Mental Health Systems*, 3(1), 26.

Douglas, S. & Craig, C. (2007). Collaborative and iterative translation: An alternative approach to back translation. *Journal of International Marketing*, 15(1), 30–43.

Drew, N., Funk, M., Tang, S., Lamichhane, J., Chávez, E., Katontoka, S., … Saraceno, B. (2011). Human rights violations of people with mental and psychosocial disabilities: An unresolved global crisis. *The Lancet*, 378(9803), 1664–1675.

Dyregrov, A., Gupta, L., Gjestad, R. & Mukanoheli, E. (2000). Trauma exposure and psychological reactions to genocide among Rwandan children. *Journal of Traumatic Stress*, 13(1), 3–21.

Faulstich, M., Carey, M.P. & Ruggiero, L. (1986). Assessment of depression in childhood and adolescence: An evaluation of the Center for Epidemiological Studies Depression Scale for Children (CES-DC). *American Journal of Psychiatry*, 143(8), 1024–1027.

Fendrich, M., Weissman, M.M. & Warner, V. (1990). Screening for depressive disorder in children and adolescents: Validating the center for epidemiological studies depression scale for children. *American Journal of Epidemiology*, 131(3), 538–551.

Geertz, C. (1973). *Interpretation of Cultures*. New York: Basic Books, Inc.

Goldstein, J.M. & Simpson, J.C. (1995). Validity: Definitions and applications to psychiatric research. In M.T. Tsuang, M. Tohen & G.E.P. Zahner (eds). *Textbook in Psychiatric Epidemiology*. New York: Wiley-Liss Inc., pp. 229–242.

Guarnaccia, P.J., Lewis-Fernandez, R. & Marano, M.R. (2003). Toward a Puerto Rican popular nosology: Nervios and ataque de nervios. *Culture, Medicine and Psychiatry*, 27(3), 339–366.

Guillemin, F. (1995). Cross-cultural adaptation and validation of health status measures. *Scandinavian Journal of Rheumatology*, 24(2), 61–63.

Hambleton, R.K. (2001). The next generation of the ITC Test Translation and Adaptation Guidelines. *European Journal of Psychological Assessment*, 17(3), 164–172.

Harkness, J., Pennell, B.E. & Schoua-Glusberg, A. (2004). Survey questionnaire translation and assessment. In S. Presser, J.M. Rothgeb, M.P. Couper, J.T. Lessler, E. Martin, J. Martin & E. Singer (eds). *Methods for Testing and Evaluating Survey Questionnaires*. Hoboken, NJ: John Wiley and Sons.

Hollifield, M., Warner, T.D., Lian, N., Krakow, B., Jenkins, J.H., Kesler, J., … Westermeyer, J. (2002). Measuring trauma and health status in refugees: A critical review. *Journal of the American Medical Association* (*JAMA)*, 288(5), 611–621.

Israel, B.A., Schulz, A.J., Parker, E.A. & Becker, A.B. (1998). Review of community-based research: Assessing partnership approaches to improve public health. *Annual Review of Public Health*, 19, 173–202.

Israel, B.A., Schulz, A.J., Parker, E.A., Becker, A.B., Allen, A. Jnr & Guzman, R. (2003). Critical issues in developing and following community based participatory research principles. In M. Minkler & N. Wallerstein (eds). *Community-based Participatory Research for Health*. San Francisco, CA: Jossey-Bass Publishers.

Joint United Nations Programme on HIV/AIDS (UNAIDS). (2014). *The Gap Report*. Retrieved from: http://files.unaids.org/en/media/unaids/contentassets/documents/unaidspublication/2014/UNAIDS_Gap_report_en.pdf

Kieling, C., Baker-Henningham, H., Belfer, M., Conti, G., Ertem, I., Omigbodun, O., … Rahman, A. (2011). Child and adolescent mental health worldwide: Evidence for action. *The Lancet*, 378(9801), 1515–1525.

Lester, P., Rotheram-Borus, M.J., Lee, S.J., Comulada, S., Cantwell, S., Wu, N. & Lin, Y.Y. (2006). Rates and predictors of anxiety and depressive disorders in adolescents of parents with HIV. *Vulnerable Children and Youth Studies*, 1(1), 81–101.

Lewis-Fernandez, R., Guarnaccia, P.J., Martinez, I.E., Salman, E., Schmidt, A. & Liebowitz, M. (2002). Comparative phenomenology of ataques de nervios, panic attacks, and panic disorder. *Culture, Medicine and Psychiatry*, 26(2), 199–223.

Lund, C., De Silva, M., Plagerson, S., Cooper, S., Chisholm, D., Das, J., … Patel, V. (2011). Poverty and mental disorders: Breaking the cycle in low-income and middle-income countries. *The Lancet*, 378(9801), 1502–1514.

Maxwell, S.E. & Delaney, H. D. (2000). *Designing Experiments and Analyzing Data*. Mahwah, NJ: Lawrence Erlbaum.

Mollica, R.F., Cardozo, B.L., Osofsky, H.J., Raphael, B., Ager, A. & Salama, P. (2004). Mental health in complex emergencies. *The Lancet*, 364(9450), 2058–2067.

Murphy, D.A., Greenwell, L., Mouttapa, M., Brecht, M.L. & Schuster, M.A. (2006). Physical health of mothers with HIV/AIDS and the mental health of their children. *Journal of Developmental and Behavioral Pediatrics*, 27(5), 386–395.

Murphy, D.A., Marelich, W.D. & Herbeck, D.M. (2012). Impact of maternal HIV health: A 12-year study of children in the Parents And Children Coping Together project. *Journal of Adolescent Health*, 51(4), 313–318.

Nagata, J.M., Ferguson, B.J. & Ross, D.A. (2016). Research priorities for eight areas of adolescent health in low- and middle-income countries. *Journal of Adolescent Health*, 59(1), 50–60.

Nampanya-Serpell, N. (2000). Social and economic risk factors for HIV/AIDS-affected families in Zambia. Paper presented at the AIDS and Economics Symposium, Durban, 7–8 July.

Neugebauer, R., Fisher, P.W., Turner, J.B., Yamabe, S., Sarsfield, J.A. & Stehling-Ariza, T. (2009). Post-traumatic stress reactions among Rwandan children and adolescents in the early aftermath of genocide. *Internal Journal of Epidemiology*, 38(4), 1033–1045.

Ollendick, T.H. (1983). Reliability and validity of the revised fear survey schedule for children (FSSC-R). *Behaviour Research and Therapy*, 21(6), 685–692.

Pan, Y. & De La Puente, M. (2005). Census Bureau guideline for the translation of data collection instruments and supporting materials: Documentation on how the guideline was developed. *Survey Methodology*, No. 2005–06.

Patel, V., Araya, R., Chatterjee, S., Chisholm, D., Cohen, A., De Silva, M., … van Ommeren, M. (2007). Treatment and prevention of mental disorders in low-income and middle-income countries. *The Lancet*, 370(9591), 991–1005.

Patel, V., Flisher, A.J., Nikapota, A. & Malhotra, S. (2008). Promoting child and adolescent mental health in low- and middle-income countries. *Journal of Child Psychology and Psychiatry*, 49(3), 313–334.

Patrick, D.L. & Chiang, Y-P. (2000). Measurement of health outcomes in treatment effectiveness evaluations: Conceptual and methodological challenges. *Medical Care*, 38(9), II14–II25.

Perneger, T.V., Leplege, A. & Etter, J.F. (1999). Cross-cultural adaptation of a psychometric instrument: Two methods compared. *Journal of Clinical Epidemiology*, 52(11), 1037–1046.

Pham, P.N., Weinstein, H.M. & Longman, T. (2004). Trauma and PTSD symptoms in Rwanda: Implications for attitudes toward justice and reconciliation. *Journal of the American Medical Association (JAMA)*, 292(5), 602–612.

Podorefsky, D.L., McDonald-Dowdell, M. & Beardslee, W.R. (2001). Adaptation of preventive interventions for a low-income, culturally diverse community. *Journal of the American Academy of Child and Adolescent Psychiatry*, 40(8), 879–886.

Proctor, E., Landsverk, J., Aarons, G., Chambers, D., Glisson, C. & Mittman, B. (2009). Implementation research in mental health services: An emerging science with conceptual, methodological, and training challenges. *Administration and Policy in Mental Health and Mental Health Services Research*, 36(1), 24–34.

Saraceno, B., Van Ommeren, M., Batniji, R., Cohen, A., Gureje, O., Mahoney, J., … Underhill, C. (2007). Barriers to improvement of mental health services in low-income and middle-income countries. *The Lancet*, 370(9593), 1164–1174.

Schaal, S. & Elbert, T. (2006). Ten years after the genocide: Trauma confrontation and post-traumatic stress in Rwandan adolescents. *Journal of Trauma Stress*, 19(1), 95–105.

Schaal, S., Elbert, T. & Neuner, F. (2009). Narrative exposure therapy versus interpersonal psychotherapy. A pilot randomized controlled trial with Rwandan genocide orphans. *Psychotherapy and Psychosomatics*, 78(5), 298–306.

Sheehan, D., Shytle, D., Milo, K., Janavs, J. & Lecrubier, Y. (2009). *MINI International Neuropsychiatric Interview for Children and Adolescents*, English Version 6.0.

Scorza, P., Duarte, C.S., Stevenson, A., Mushashi, C., Kanyanganzi, F., Munyana, M. & Betancourt, T.S. (2017). Individual-level factors associated with mental health in Rwandan youth affected by HIV/AIDS. *Social Psychiatry and Psychiatric Epidemiology*, 52(7), 867–875.

Silove, D. (2004). The challenges facing mental health programs for post-conflict and refugee communities. *Prehospital and Disaster Medicine*, 19(1), 90–96.

Stichick, T. (2001). The psychosocial impact of armed conflict on children. Rethinking traditional paradigms in research and intervention. *Child & Adolescent Psychiatric Clinics of North America*, 10(4), 797–814.

Tol, W.A., Barbui, C., Galappatti, A., Silove, D., Betancourt, T.S., Souza, R., … Van Ommeren, M. (2011). Mental health and psychosocial support in humanitarian settings: Linking practice and research. *The Lancet*, 378, 1581–1591.

Trickett, E.J. & Espino, S.L. (2004). Collaboration and social inquiry: Multiple meanings of a construct and its role in creating useful and valid knowledge. *American Journal of Community Psychology*, 34(1–2), 1–69.

United Nations (UN). (2015). *The Global Strategy for Women's, Children's and Adolescent's Health (2016–2030)*. Retrieved from: http://globalstrategy.everywomaneverychild.org/pdf/EWEC_globalstrategyreport_200915_FINAL_WEB.pdf

United Nations Children's Fund (UNICEF). (2009). *MachelSstudy 10-Year Strategic Review: Children and Conflict in a Changing World*. Retrieved from: https://childrenandarmedconflict.un.org/publications/MachelStudy-10YearStrategicReview_en.pdf

United Nations Children's Fund (UNICEF). (2016). *The State of the World's Children, 2016*. Retrieved from: http://www.unicef.org/publications/files/UNICEF_SOWC_2016.pdf

Van Widenfelt, B.M., Treffers, P.D.A., De Beurs, E., Siebelink, B. & Koudijs, E. (2005). Translation and cross-cultural adaptation of assessment instruments used in psychological research with children and families. *Clinical Child and Family Psychology Review*, 8(2), 135–147.

Weisz, J.R., Somsong, S., Wanchai, C., Weiss, B., Achenbach, T.M. & Walter, B.R. (1987). Epidemiology of behavioral and emotional problems among Thai and American children: Parent reports for ages 6 to 11. *Journal of the American Academy of Child and Adolescent Psychiatry*, 26(6), 890.

Wells, K., Miranda, J., Bruce, M.L., Alegria, M. & Wallerstein, N. (2004). Bridging community intervention and mental health services research. *The American Journal of Psychiatry*, 161(6), 955–963.

World Health Organization (WHO). (2007). *Process of Translation and Adaptation of Instruments*. Retrieved from: www.who.int/substance_abuse/research_tools/translation.

World Health Organization (WHO). (2010). mhGAP *Intervention Guide for Mental, Neurological and Substance Use Disorders in Non-specialized Health Settings*. Retrieved from: http://www.minsa.gob.pe/dgsp/archivo/salud_mental_documentos/14_mhGAP_Intervention_Guide.pdf

Zraly, M., Betancourt, T.S. & Rubin-Smith, J.E. (2011). Primary mental health care for survivors of collective sexual violence: Findings from Rwanda and implications for services in the great lakes region. *Global Public Health*, 6(3), 257–270.

Zraly, M. & Nyirazinyoye, L. (2010). Don't let the suffering make you fade away: An ethnographic study of resilience among survivors of genocide-rape in southern Rwanda. *Social Science & Medicine*, 70(10), 1656–1664.

Chapter 10

Creation of culturally appropriate developmental assessment tools for rural Africa

Melissa Gladstone

Introduction

With many children in Africa now surviving past their fifth birthday, there has been a shift in focus from child survival to child well-being and thriving. African governments and agencies working to improve the health outcomes of children will now be looking beyond the numbers of children surviving to the quality of life and potential for children to develop and become active members of society. The United Nation's 2030 Sustainable Development Goals (SDGs) champion this with the aim of promoting equity across various dimensions (including health and well-being, education and economic growth). Furthermore, the Global Strategy for Women's, Children's and Adolescents' Health proposes a threefold agenda: the Survive (end preventable deaths), Thrive (ensure health and well-being) and Transform (expand enabling environments) agenda.[1] For a child to 'thrive', they must make good developmental progress from birth until the end of adolescence.[2] In promoting agendas of enabling children to reach their full developmental potential, agencies require appropriate benchmarks to provide clear evidence of the developmental progress of children.

There have been few low-cost, cross-culturally validated and simple tools, which can be used in African settings, to assess children's development and to enable these benchmarks to be judged. Much of this has resulted from a lack of emphasis on measurement of child development in African settings. Furthermore, many of the assessments in the past have relied on Western tools, to which many children in African settings have not been exposed. These also tend to be expensive and those administering them require extensive training.

This chapter describes the process of systematically creating the Malawi Developmental Assessment Tool (MDAT), a tool created for a low-income African

1 Kuruvilla et al., 2016, 398–400.
2 Black et al., 2017, 77–90.

setting, which is now being used in several countries in Africa for both research and programmatic purposes. This chapter describes the context of Malawi and how the cultural context of the society places emphasis on certain developmental milestones, often linked to expectations and aims for children in that setting. It outlines the importance of not only creating culturally appropriate tools but also, for the purposes of clinical work, the need to create simple-to-use tools which can be used by community workers who may have limited training in early child development. This chapter then describes the methodology and processes used to create a culturally appropriate developmental assessment tool, before raising questions about the use of these tools and whether they lead to better outcome data and the impact of screening children for developmental problems where there is often little in the way of referrals and support.

Malawi in context

Malawi is a densely populated country of over 14 million people situated in southern Africa. It is one of the poorest countries in the world with a per capita income of US$320 per year,[3] with 39 per cent of the population living below the stated poverty line. Over 80 per cent of Malawi's population is rural.[4] Half of all women and 62 per cent of 15–24 year olds have not completed primary school education.[5] Malawi has been severely affected by the sub-Saharan HIV pandemic with HIV rates of 9 per cent in 2015. Life expectancy rates have improved due to the introduction of antiretroviral therapy and are now up to 62 years.[6]

There are limited cadres of extension workers, few of whom, if any, have been trained in child development,[7] but there is an increasing number of health surveillance assistants who manage many conditions at the primary care level, each covering approximately 1 000 households.[8] Malawi has dramatically increased the scope and coverage of essential early childhood development (ECD) services in health, nutrition, education, early stimulation, child protection and care for special needs children since the 1990s. The number of ECD-aged children provided with services grew from 1 per cent in 1994 to 40 per cent in 2015.[9] Much of this has come about with the creation of community-based childcare centre (CBCC) services initiated

3 World Bank, 2018.
4 World Bank, 2018.
5 ICF International, 2016.
6 World Bank, 2016.
7 Phuka et al., 2014, pp. 183–191.
8 Gilroy et al., 2013, pp. 573–585.
9 Malawi Ministry of Gender, 2016.

and run by community members who are trained for two weeks (12 days)[10] using a comprehensive ECD basic training manual.[11] With this burgeoning of programmatic work and interest, there is a need for a language to describe the attainment of ECD milestones and for tools to assess the outcomes of interventions.

Culture and its effect on development

It is evident that theories of child development reflect the culture in which they originate and that concepts may be very different from the popular Western child development theories,[12] which reflect Western philosophical thought, and often separate the rational and cognitive aspects of development from the emotional or affective aspects. Child development is embedded in the context of social relationships and sociocultural tools and practices in the environment in which the child grows up,[13] and this is a crucial component of cross-cultural assessment.

Cognitive development (the ability to problem-solve) holds particular interest because of its assumed strong association with 'intelligence'. Indigenous concepts of intelligence vary widely between cultures and may have an effect on which abilities are encouraged and discouraged within a culture.[14] In the West, a child's ability to answer questions is facilitated to optimise their preparation for school. In other settings, this may not be emphasised in the same way. For example, early research done with rural agrarian communities in Africa provide descriptions of intelligence as those who are 'slow', 'careful' and 'active' (Uganda)[15] or who have 'cooperation' and 'obedience' (Zambia),[16] or who are good at 'social integration' and 'responsibility' (Malawi).[17] Studies of Kpelle farmers in Liberia sort objects into functional groups (e.g., knife with orange, potato with hoe) rather than into categorical groups as might be expected in Western intelligence tests.[18] These differences can mean that individuals, when tested in different settings in the world, may perform differently. Despite this, there are many cognitive tests that do work in different settings to assess children's intelligence, particularly those with less language-based instructions. The age of attainment, however, may vary depending on the ability to grasp unfamiliar testing concepts and ideas. Some studies describe the specific differences in perception and fine motor

10 Munthali et al., 2014, p. 305.
11 Malawi Ministry of Gender, 2011.
12 Berry, 2011.
13 Lancy, 2010, pp. 99–100; Levine & New, 2008.
14 Serpell, 2000, pp. 549–580.
15 Wober, 1972, pp. 327–328.
16 Serpell, 1976.
17 Kambalametore et al., 2000, pp. 802–807.
18 Glick, 1975.

skills between African and Western children. Studies from Zambia demonstrated how important it is to be familiar with the materials or stimuli that are being used to test children; one study showed how Zambian children were much quicker at copying models made from wire than were children from the West, whereas children from the United Kingdom were shown to be more adept at copying shapes using pencils.[19] Child development assessment may, therefore, depend on what the child is used to using and seeing in their own culture.[20]

Broadly speaking, Western societies are more likely to train their children to be competitive and achievement-orientated, encouraging egoistic-dominant and attention-seeking traits, whereas other societies may expect children to be the opposite—more communitarian and inclusive. Behaviours that support the family and community may be more encouraged in some African societies.[21] Qualitative studies from rural Malawi demonstrated the importance of obedience, social responsibility and respect. This might include running errands, carrying messages with full recall, telling stories to friends and parents, playing games and reporting back on what was said in church.[22] The *umunthu* or 'the civilised or cultured child, the child who behaves and who has social responsibility' is a concept that is linked to these expectations of children in Malawian society.[23] A child who has become *umunthu* is one who is able to socialise with peers as well as elders and respects social conventions, such as kneeling for elders, and showing special respect for their father.

Language development plays an essential role in cognitive development, first as a means of social communication but also to shape cognitive processes and organise thought.[24] Observational studies from Kenya describe how even the amount of parental eye contact and speech with children varies between Kenyan and British parents. As languages differ qualitatively and in complexity, acquisition will vary from one language to another.[25] For example, language affects the categorisation of groups or the interpretation of pictures or objects, and even affects the conceptions that people have about time.[26] The way language is used epistemologically may also affect the way questions are answered.[27] For example, there are cultural differences in conversation and discourse rules, turn-taking, interruptions, silences as communicative devices and non-verbal signals, all of which affect thought and cognition.[28]

19 Serpell, 1976.
20 Serpell, 1979.
21 Levine & New, 2008.
22 Kambalametore et al., 2000, 802–807.
23 Kambalametore et al., 2000, 802–807.
24 Vygotsky, 1961.
25 Ochs & Schiefflin, 1984, pp. 276–320.
26 Boroditsky, 2001, pp. 1–22; Slobin, 1991, pp. 7–26.
27 Carter et al., 2005, pp. 385–401.
28 Payne & Taylor, 2002.

Since the 1970s, many authors have demonstrated advanced development in some motor milestones in African children.[29] Some studies have, however, supported a view that cultural differences (rather than genetic differences) may play a role in this accelerated development. For example, Super describes the specific words in the Kipsigi language for the teaching of sitting and walking with relatively standardised methods between parents.[30] Around the age of five or six months, children are taught to sit by being put into a special hole in the ground on a daily basis to help support their backs. Even in the first months of life, Kipsigi babies are seen to be in a sitting position 60 per cent of the time, and from approximately one month of age, mothers play *kitwalse* (to make jump), where the infant is held under the arms and bounced regularly, a technique to encourage walking. Further examples of parental stimulation of children include propping infants against stools[31] and luring novice walkers with food.[32] Some experimental work to assess the effects of exercise and handling on child development, gross motor and fine motor skills has been conducted, but is limited.[33] One study demonstrated daily exercise sessions (stepping, sitting or both) with infants' improved acquisition of milestones.[34]

Use of developmental assessment tools in different cultural contexts

Programmes and studies using development as an outcome measure in low- and middle-income countries (LMICs) have tended to use tools developed in high-income countries.[35] Developmental assessment tests, such as the Griffiths and the Bayley II or III, have been used in many studies as outcome measures in LMICs. Personal social subscales are not often included in studies because they are considered culturally inappropriate.[36] Many tools are simply translated or adapted, but only occasionally validated before use.[37] Such instruments may be valid when comparing groups but, as an outcome measure on their own, they may be inaccurate as they contain many items alien to children from a non-Western culture. To add to this, only some tools have normal reference values for children in these settings due to difficulties in attaining large enough samples of rural participants, particularly in African settings. Most of these studies have shown that there

29 Warren & Parkin, 1974, pp. 966–971.
30 Super, 1976, pp. 561–567.
31 Bril & Sabatier, 1986, pp. 439–453.
32 Konner, 1977, pp. 287–328.
33 Riethmuller et al., 2009, pp. 782–792.
34 Zelazo et al., 1993, pp. 686–691.
35 Fernald et al., 2009.
36 Peet et al., 2015, pp. 1–20.
37 Sabanathan et al., 2015, pp. 482–488.

are differences in age of item attainment and that it is important to gather local normal reference values before use in screening other populations.[38]

As no Western developmental tools are completely satisfactory in terms of their validity in low-resource settings, many researchers have created their own tools, often adaptations of existing tools. The results of these have been variable, with many needing further refinement.[39] Adaptations of the Bayley III developmental assessment tool have been the most common, with many creating pictures of more recognisable objects or simply translating items into the local language.[40] Specific examples of problems with the Bayley III include the use of the picture of a dog. In Malawi, dogs are considered scary animals. If a child has done something naughty, the mother may say, 'I will take you out to that big dog'. Hence, when shown the picture of the dog in the book in the Bayley III, many children scream and their distress often upsets testing. Furthermore, the ice-cream cone used in the Bayley II, which has to be fitted together, is alien to children in this setting. Children typically think it is two pieces of wood for lighting a fire. A further example is the question about pronouns 'he/she'. These are not used in Chichewa, one of the official languages of Malawi, and therefore there is no translation to this question.[41] Researchers in The Gambia studying children post cerebral malaria, compiled their own tests using a variety of intellectual and sensory motor functions. These included classification tasks, word–object association, exclusion tests, syllable recall, visual memory and reaction-time testing.[42] Few differences were found between the groups when using this newly created test and there were concerns that the test was not sensitive enough. The KEMRI Wellcome Trust Research Programme in Kenya has since created an assessment battery adapted from the Kaufman-ABC[43]—the Kilifi Assessment Battery, which includes tests of information-processing skills, achievement, visuomotor speed, attention and planning, and language development through tasks such as face recognition, gestalt closure, memory for a visual sequence, recognition, integration of components of a picture presented in segments, and memory for digit sequences and verbal sequences.[44] The Kilifi team has also created a developmental inventory with fine motor and gross motor domains of development for six-month to three-year-old children to assess the outcomes of younger children with cerebral malaria.[45] They have since created a parent report checklist, which is being used more widely.[46]

38 Aina & Morakinyo, 2005, pp. 151–156; Lansdown et al., 1996, pp. 283–290.
39 Baddeley et al., 1995; Holding et al., 2004, pp. 246–260; Van Hensbroek et al., 1997, p. 129;
40 Murray-Kolb et al., 2014, pp. 261–272; Yousafzai et al., 2015, pp. 1247–1257.
41 Cromwell et al., 2014, pp. 223–230.
42 Van Hensbroek et al., 1997, p. 129.
43 Kaufman & Kaufman, 1983.
44 Holding et al., 2004, pp. 246–260.
45 Abubakar et al., 2008, pp. 217–226; Prado et al., 2014, pp. 447–454.
46 Prado et al., 2016, pp. 1–12; pp. 814–822; pp. 43–51; pp. 784–793.

More recently, some researchers have questioned the need for continued adaptation of 'paper and pencil' tests and have queried whether it may be more useful to have measures of biological processes. These include tools such as functional near-infrared spectroscopy,[47] eye tracking, the use of electroencephalograms (EEGs) and auditory evoked potentials (AEPs),[48] and magnetic resonance imaging (MRI).[49] In the future, these tools may provide a way of measuring brain function that surpasses the need for creating culturally relevant measures. The problem with these tools is that they do not provide any information about the functional abilities of the children who are being assessed and, therefore, do not reinforce the provision of support for children in any way. A tool that can assess the functional abilities, while also providing information about the areas in which a child is excelling and those they find more difficult, may be much more useful when providing advice or help to families.

Creating culturally appropriate items to use in a developmental assessment tool for an African setting

A methodology and process for generating developmental tools in low-income settings was created when developing the MDAT and this has since been used in other studies.[50] This provides a framework for similar research and the creation or adaptation of tools for future use in Africa. These processes include:

- creating and adapting items—focus groups and searching for items through literature and preliminary studies
- rigorously translating and back-translating items
- verifying items through face and content validity
- piloting items to aid in article placement and positioning and to assist with clarifying instructions and language problems
- creating age norms for developmental milestones on a stratified age sample using logistic regression analysis, and testing performance of items through goodness of fit on logistic regression
- conducting reliability assessments for all items through immediate and delayed inter-observer and intra-observer reliability testing (kappa statistics)
- using consensus techniques to examine all items for reliability, good fit and subjective ratings, and removing items that perform poorly
- validating items using construct validity.

47 Lloyd-Fox et al., 2014, p. 4740
48 Fernandes et al., 2014.
49 Croteau-Chonka et al., 2016, pp. 413–421; Dean et al., 2015, pp. 1921–1933; Deoni et al., 2015, pp. 147–161; Deoni et al., 2016, pp. 1189–1203.
50 Gladstone et al., 2010.

The MDAT is a simple-to-use, pictorial tool that was created for use by health professionals and community workers with only minimal training and no preliminary knowledge of child development. All MDAT questionnaires and charts for attainment of items can be downloaded from the *PLOS Medicine* website[51] or obtained by contacting the authors for the most recent version. The MDAT has normal reference values for attainment of all items and has been shown to be reliable and valid in Malawian populations.[52] The normal reference values provide Z scores, which can be used for comparing children's development across age ranges. The MDAT uses a small basket of items that are known to most Malawian households. An example of the items used for the expressive and receptive language components of the MDAT are shown in Figure 10.1, including a bowl, a spoon, a cup, a pen and a model of a bicycle. All of these can be made or simply bought from a local market.

Creating and adapting items through qualitative methods

To create new items for a developmental tool for use in rural settings in Malawi, we sought the perspectives of caregivers and professionals as to their understanding and beliefs about child development. We undertook qualitative research to identify themes and ideas relating to the understanding of child developmental milestones in Malawi. We wanted to gather in-depth descriptive information that was not influenced by our own Western approach to child development. Qualitative methods can capture concepts and perspectives from different cultures and provide language that might be useful for framing questions.[53]

Separate village and professional focus groups were undertaken. Professional focus groups took place prior to the village focus groups to enable us to see which themes and ideas needed further exploration by lay people in the village communities. We hoped that focus group discussions would enable a relaxed forum for discussion,which did not discriminate against those who were not able to read and write.[54]

Examples of many of the developmental items, which were created from the focus groups, are published in the literature.[55] These included things such as 'peeling a banana', 'playing clapping games with friends', 'making houses out of corn cobs', 'shelling peanuts', 'showing independence', 'making their own porridge' and 'preparing fires for cooking'.

51 Gladstone et al., 2008, pp. 23–29.
52 Gladstone et al., 2008, pp. 23–29.
53 Arthur & Nazroo, 2003, pp. 109–137.
54 Kitzinger, 1995, pp. 299–302.
55 Gladstone et al., 2010.

Figure: 10.1: Items used for the language section of the MDAT

Source: The author

Translation, back-translation and the creation of a kit and pictures for a tool

For the MDAT, we ensured consistency and coherence of items through translation and back-translation with the help of a language specialist and authority on Chichewa from the University of Malawi. Each item was translated from English to Chichewa. This was then read by a team who, once happy with the translation, sent it for back-translation by a language expert. The subsequent version was then read by the research team and any errors were discussed, retranslated and then back translated to check that the phrases were correct. Many items were illustrated by an artist and can be found online or by contacting the authors.[56] We then prepared a small basket of materials to be used with the questionnaire, such as those shown in Figure 10.1, for naming (expressive language) and identifying (receptive language) items. These were prepared in consultation with the research team. All items came from local sources such as the small markets around Blantyre. Some items were constructed by a local woodworker, such as the pegboards and the bricks and stands to raise a piece of rope to jump over. The full list of items and the instruction manual are published on the Internet.[57]

56 Gladstone et al., 2008, pp. 23–29.
57 Gladstone et al., 2010.

Face and content validity

Face validity is a cursory review of items by untrained judges to see whether they think the items look correct—a casual assessment of item appropriateness.[58] Content validity is a subjective measure of how appropriate the items in a test seem to a set of reviewers who have some knowledge of the subject matter. It refers to the comprehensiveness of the measure, and to judgements about the extent to which the content of the instrument logically examines the attributes or features it is intended to measure.[59] This type of validity provides evidence that 'a logical structure is mapping the items on the test to the content domain', therefore illustrating the relevance of each item and the adequacy with which the set of items represents the content domain.[60] To create a developmental assessment tool for rural Africa, both of these forms of validity were assessed through group and individual discussion. At this phase of validation, we moved items and added others to produce MDAT Draft II.[61]

Piloting

The MDAT tool was piloted with a large number of children in two stages over a six-week period.[62] Pilot assessments were observed by three different members of the research team, which were followed by group discussions to enable respondent validation of items by the users. The piloting process consisted of checking the wording of items and looking for items that hit a ceiling because they were too difficult or easy for the targeted children. At this stage, items were added to improve coherence or precision and other items were deleted if they were felt to be not discriminatory enough to assess child development or if it was not feasible to administer them in a field setting (e.g., they were too complicated). In some areas, particularly the gross motor domain, there were not enough difficult gross motor items available for the older age group (five to six years) and, therefore, more items had to be created. Some of the same items could be tested differently at different ages, depending on the way in which they were stated, and these were separated into subsections and consequently provided with different questions. This limited ambiguity during testing and made all questions dichotomous. For example, the item, 'how many words can your child say (other than dada/mama)?' was then subdivided into 'says two words other than dada/mama' and 'says at least six or more words'.

58 Litwin, 2003b, pp. 31–43.
59 Litwin, 2003b, pp. 31–43.
60 American Psychological Association (APA), 1985.
61 Gladstone et al., 2008, pp. 23–29.
62 Gladstone et al., 2010.

Establishing normal reference ranges in a large sample (standardisation)

To construct normal developmental reference values, a process of standardisation needs to be carried out in a reference (or ideal) population, depending on the aim of the tool. In Malawi, different geographical areas of the country—with similar percentages of rural-to-urban children and similar tribal mixes of Yao, Lomwe and Chewa peoples—were used.

Recruitment

For the MDAT, we recruited 'healthy' children, i.e., they were free of illness and did not have malnutrition or developmental problems. These children were recruited randomly from mothers attending clinics (one per family) between the ages of zero and six years. One in every three consenting mothers was asked to bring a child to the next clinic. Weight, height and mid-upper-arm circumference (MUAC) were measured prior to carrying out the MDAT. If the child's weight for height was less than 80 per cent of that expected for their age, or if their MUAC was less than 12.5 centimetres, they were excluded.[63] Other exclusion criteria included evidence of prematurity, neurodisability, or chronic or acute illness.

Stratified quota sampling

For the MDAT, quota sampling techniques were used and target numbers of children for each of the different age groups (from zero to five years) were sought, as had been previously outlined by the Denver II team.[64] Children's dates of birth and ages were identified from available birth data or from the health passport/immunisation status book, which mothers or carers carry for all health reviews. Once enough children of a particular age range had been recruited, no more children of that range were invited to participate. We then directed our recruitment at the age ranges we were missing and asked mothers to bring only children of those ages to the clinics in subsequent weeks.

The observation of developmental items was undertaken at the local health centres, usually in a quiet location outdoors, and took approximately 35 to 40 minutes. Where possible, items were directly observed, but items were accepted by report if the mother was very clear that the child could do the item and there was no doubt when assessing associated areas of development. Items were assessed until the child failed seven consecutive items using floor and ceiling methods.

63 Gladstone et al., 2010.

64 Frankenburg et al., 1990.

Floor and ceiling effects

In most developmental screening or assessment tools, investigators reach a point where they no longer ask any questions when they feel that the child is no longer able to do any of the items.[65] This means that the investigator is not asking too many items that are not relevant to the age of the child. In this way, only questions around the child's developmental age were asked. For example, it is not necessary to see if a one-year-old child can 'hop six steps' or 'jump over a rope' when you have already elicited that they have failed at 'walking' and 'running'.

Methods of cross-sectional data analysis used in creating reference norms

Most studies that have standardised developmental milestones have used cross-sectional data (data collected by observing many subjects at the same point in time), rather than longitudinal data (data collected by observing the same individuals over time).[66] For the MDAT, we aimed to create references that could be used easily and which did not require the use of manuals and tables. Similar techniques to the Denver II were, therefore, chosen where logistic regression analysis and goodness-of-fit statistics were used to examine the relationship between the item and age of attainment.

For the MDAT studies, normal reference ranges for children passing items were constructed using logistic regression analysis, with a decimal age used as the explanatory variable.[67] For any curves where 'goodness of fit' was significantly poor, refitting was done using triple-split spline regression, as has been outlined by Greenland and others.[68] Three logistic curves could then be fitted, one for each region, based on a cut-point split. Cut points in general were kept at the ages corresponding to the 35th and 65th centiles for the probability of passing. For several items that performed less well, cut points were chosen by viewing the graphs to facilitate a good fit and these were then used in the analysis instead of the 35th and 65th centile cut points.

The fitted values from the model for each item were plotted against the observed data. Using the predicted probabilities found from the logistic regression analyses, the ages at which 25 per cent, 50 per cent, 75 per cent and 90 per cent of children passed were formulated for each of the developmental items. These were then used to plot the normative age attainment of each milestone in a box-plot in graphs similar to the procedure described for the Denver II.[69]

65 Frankenburg et al., 1990; Griffiths & Huntley, 1996; Newborg et al., 1984.
66 Altman, 1991, pp. 74–106.
67 Gladstone et al., 2008, pp. 23–29.
68 Greenland, 1995, pp. 356–364; Pastor & Guallar, 1998, pp. 631–642.
69 Gladstone et al., 2010.

In a further exploratory analysis, we added other co-variates (sex, socio-economic status, and height and weight standard deviation scores; Z scores) to assess their effect on the probability of passing the developmental items. Socio-economic status had a significant effect on the age attainment of almost one-third of items in some domains, and nutritional status (height for age Z score) also had an effect on between almost 50 per cent and 65 per cent of items, depending on the domain with weight for age Z score affecting almost 40 to 60 per cent of items, again depending on the domain.

Reliability testing

When creating developmental assessment tools, reliability plays an important role in assessing how well a tool performs. It reflects the amount of error, both random and systematic, that is inherent in any measurement and is a way of evaluating a test against itself, instead of against a different reference standard test.[70] Reliability can be measured in a number of ways, depending on the reasons for using the test.

Test–retest reliability is a very common determinant of survey instrument reliability. It is a measure of how reproducible a set of results is and is usually carried out by having the same respondents do a survey or questionnaire at two points in time to see how stable their responses are. This can be done by different examiners (inter-observer) or the same examiner (intra-observer) on two occasions. When carrying out test–retest reliability, it is important that the items or variables being tested do not change significantly over time. Reliability can be analysed in a variety of ways. It can be done using kappa statistics, percentage agreement and correlation coefficients, but also by measuring the standard error of the mean (SEM). When testing reliability, the time period for repeating test–retest reliability recommended and used in many studies is usually less than two weeks, given how quickly young children can develop.[71]

Test–retest reliability can be intra-observer reliability where variation occurs *within an observer* as a result of testing multiple exposures to the same stimulus. It can also be inter-observer reliability—a measure of how well *two or more observers agree* on the assessment of a variable. This is good for looking at the subjective (how much a person's viewpoint affects the measure) component in measurement of an item. This type of reliability will contain all the sources of error contributing to intra-observer reliability, as well as those differences that may arise between observers.

Internal consistency is also commonly used when assessing scales. It is applied to groups of items that are thought to measure different aspects of the same concept and is a good indicator of how well different items measure the same issue. It is described as the most suitable test of reliability in cases where an individual's score on some

70 Aiken, 1997.

71 Litwin, 2003a, pp. 5–26.

attribute, such as development, may change significantly over a period of time. For the MDAT, we ensured that a number of methods of reliability were used to secure a robust test for use. Intra-observer reliability, where the same research assistant saw the same child and repeated the test again within two weeks, was undertaken in both studies. Inter-observer reliability, where two or more observers assessed the same child, was also undertaken.

Reliability can be analysed in a number of different ways. The most common statistical way of measuring agreement between observers is by measuring the kappa statistics (k) with 95 per cent confidence intervals. This is a statistical measurement of 'how much better than chance are the agreements between observers'.[72] The kappa coefficient helps to deal with the situation where impressive results are created by a preponderance of either abnormal or normal cases where there may be high agreement by chance alone.[73] Positive values range from 0 to <0.2 indicating poor agreement, >0.2 to 0.4 fair agreement, >0.4 to 0.6 moderate agreement, >0.6 to 0.8 good agreement and >0.8 to 1 very good agreement.[74] For the MDAT, kappa statistics (k) with 95 per cent confidence intervals were used. Cronbach's alpha was also used to look at the correlation between items in future reliability and validity studies.

For the MDAT studies, we undertook reliability testing in the field using a number of methods and processes. To randomise the process, we undertook a systematic process every day. The first child on the day of assessment was tested for inter-observer immediate reliability and the second child for inter-observer delayed reliability, with the third child being tested for intra-observer delayed reliability. Inter-observer reliability was determined by assessing the same child independently on the same occasion by two observers. Inter-observer delayed reliability was then conducted by assessing the same child independently on the same day at different times by two different examiners.[75] Finally, we measured intra-observer delayed reliability by the same assessor examining the same child two weeks apart. Reliability was measured using kappa (k) statistics as well as percentage agreement to assess observer agreement for each question.

Final evaluation of a tool by consensus

Consensus methods are a process of synthesising information using a wider range of information than is common in statistical methods. We used both the Delphi and the Nominal group process for the MDAT studies. The Delphi process is where a large group of experts are contacted by post and then relevant individuals are invited to

72 Streiner & Norman, 2003, pp. 126–152.
73 Cohen, 1960, pp. 37–46.
74 Landis & Koch, 1977, pp. 159–174.
75 Gladstone et al., 2008, pp. 23–29.

provide knowledge; headings are then ranked and redistributed for opinions. The Nominal group technique uses a highly structured meeting to gather information from relevant experts (usually nine to 12 of them). It is often used to identify measures in clinical trials. These meetings are usually undertaken as a single meeting where two rounds are carried out with panellists rating, disputing and rerating items. They are facilitated by an expert on the topic and participants contribute ideas to a facilitator, then similar suggestions are grouped and ranked. The ranking is tabulated and presented and the overall ranking is discussed and reranked. The final rankings are tabulated and fed back. Some of this is similar to focus groups, but the process is usually directed towards a single goal and is less concerned with eliciting ideas than ranking and consensus.

Consensus group meetings were held at the end of the studies. This process helped to finalise the items that were to be included in the final developmental tool. Nominal methods of consensus were chosen as the group process allowed for discussion of each of the items. This occurred once all the data had been gathered and analysed. Information that was used included goodness of fit on logistic regression, as well as the effect of gender and socio-economic status on the regression curves and reliability statistics. Furthermore, information gathered from the respondent validation from the research assistants, interpretability and any information regarding the number of missing items was taken into account.

An expert panel reviewed the data and decided, through consensus, which items should remain, which should be modified in the future and which items should be removed from that version of the MDAT. Items were evaluated at these meetings by studying the goodness of fit in logistic regression and by looking at the graphs, the reliability figures for each item, the subjective and qualitative information provided by staff and by taking into account whether gender had any effect on the logistic regression curves. We aimed to have items with a good fit on logistic regression, good to excellent reliability on the kappa statistics (>0.6), few problems with qualitative subjective ratings by staff and assessors, and with no effect from gender on attainment of logistic regression curves. There were some items where the age ranges for attainment of that item were exactly the same within one or other domain. At a consensus meeting, a decision was made to retain only one of these items in any one domain in the tool in the future. Once the final items were chosen, they were fed back to the group and rediscussed for a final opinion.

Scoring of items and construct validity

Construct validity is a measure of how meaningful a scale or instrument is, and is regarded as a gestalt of how well a survey instrument performs in a multitude of settings and populations over a number of years. It can be assessed by looking at two forms of validity—convergent and divergent validity. Convergent validity is a way of

showing that several different methods for obtaining the same information about a given trait or concept produce similar results. For example, in developmental testing, this might be the way in which scores on the language domain may correlate highly with scores in the cognitive domain of development, as these should be expected to be interrelated and that a child's cognitive abilities will also be reflected in their ability to use language. Divergent or discriminant validity is a way of checking that a tool does *not* correlate with dissimilar unrelated items. For example, one would expect the domains of gross motor development and language development to be divergent. When doing inter-item correlations between and within the scales, there should be more correlation within a scale than between them.[76] Another way of assessing the validity of a construct is by carrying out construct validity by extreme groups (which is also referred to as discriminative validity—different from discriminant validity). This is a fairly easy way of assessing validity by using the scale on two groups; one that has the trait or behaviour and one that does not.

As there is no gold standard developmental assessment tool for Malawi, it was not possible to carry out convergent validity testing with other tests. We therefore chose to carry out divergent validity testing by comparing scores on the normal population with those of two populations that would be expected to experience some developmental delay. These groups were those with neurodisabilities (resident in Feed the Children centre) who by definition have developmental delay and those with severe malnutrition (resident in Umoyo house) who have demonstrated developmental delay.

To do this, a score was generated as a categorical pass or fail for each item, and each score was used to validate the tool in a series of different assessments. At this stage of production of the tool and for validation purposes, all items relevant to the age of testing were tested and then scored. To make a decision about the overall ability of the child, if the child failed two or more items in any one domain at the chronological age at which 90 per cent of the normal reference population would be expected to pass, they were deemed to have 'failed' the test, meaning that they needed review in the future.[77] Secondly, a continuous score was obtained by adding up the number of items passed by the child per domain, as well as a score which covered all domains to create the total. These scores varied with the age of the child but did not, at this stage, take into account the age of the child (as do Z scores which have subsequently been created).[78]

In measuring construct validity of the MDAT, both sets of scores were used to validate the tool by comparing a matched group of disabled or malnourished

76 Campbell & Fiske, 1959, pp. 81–105.
77 Gladstone et al., 2008, pp. 23–29.
78 Gichuru, 2017.

children with normal children of the same age and sex. It was assumed that disabled or malnourished children would have developmental delay and would, therefore, be good groups for a comparative study of construct validity. The normal children were randomly chosen by a computer-generated random-number list. In both these methods, 'Don't know' is counted as a 'No' answer, meaning that if the child refuses or, for some reason, does not do the task—even if the mother says the child is able to do it—the child will score a 'No'. These cases were rare in our studies, but it is important to factor this in.

For the MDAT, children up to six years of age with known neurodisabilities and marasmus (height/weight <80th percentile) were recruited as comparison groups. These groups were chosen as there is good evidence from the literature that these children are likely to have moderate to severe developmental delay.[79] To compare statistically the differences in the number of passes/fails achieved by the different groups in the construct validity assessment, a paired McNemar's test was used. Sensitivity and specificity were calculated.

To validate a tool further, sensitivity to change is a helpful characteristic. The MDAT tool has since been used in studies on outcomes of cerebral malaria[80] and prematurity[81] in Malawian populations, and has since been used in several larger studies in Malawi[82] as well as in other countries.[83] It has identified developmental delay in these populations and will continue to be useful as a direct assessment of child development in African settings. This tool is an accurate measure of child development and can be used easily in these settings. It has the added advantage of being cheap and easy to administer, even for those with limited child development training and experience, and it provides clear levels of child development for rural African children. An added advantage is that it can be used as both an assessment and an intervention measure.[84] As urbanisation and the progress of children changes, it will be important to restandardise this tool and to update current training schedules and programmes connected to its use. This is currently in progress and we hope to have a version that will be more generalisable across settings.

Conclusion

Despite the fact that Malawi still has many indicators of poor health and a difficult economic situation, progress has been made with regard to child development.

79 Grantham-McGregor et al., 1978, pp. 773–778; Powell et al., 1995, pp. 22–29.
80 Boivin et al., 2011, pp. 263–271.
81 Gladstone et al., 2011.
82 World Bank, 2014.
83 Harrison et al., 2014, pp. 330–347.
84 Henry et al., 2016, pp. 311–325.

The tool has now been incorporated into the recommendations for screening for developmental disorders and disability in Malawi, as well as into new programmes to identify children with developmental delay early to enable timely support through community-based childcare centres.[85] Without a tool to provide normative ranges of developmental items, this would be more difficult to do.

For clinical settings, the idea of having a language in which to discuss child development may in itself provide a pathway for increasing awareness in local health workers as well as parents and carers. The next question, however, is how these tools can be integrated further into low-cost health systems to improve long-term outcomes for these children. This may require the use of simple parent report tools, which can be used in child surveillance programmes and embedded in the under-fives' parent-held records given to every mother at the birth of their child. A number of teams are currently working on this and will hopefully provide evidence of which parent-reported developmental indicators may work best across settings in the world.

References

Abubakar, A., Holding, P.A., Van Baar, A., Newton, C.R.J.C. & Van de Vijver, F.J.R. (2008). Monitoring psychomotor development in a resource limited setting: An evaluation of the Kilifi Developmental Inventory. *Annals of Tropical Paediatrics*, 28, 217–226.

Aiken, L.R. (1997). *Psychological Testing and Assessment*, Vol. 9. Boston, MA: Allyn and Bacon.

Aina, O.F. & Morakinyo, O. (2005). Normative data on mental and motor development in Nigerian children. *West African Journal of Medicine*, 24(2), 151–156.

Altman, D.G. (1991). Designing research. In D.G. Altman (ed.). *Practical Statistics for Medical Research*, Vol. 1. London: Chapman and Hall, pp. 74–106.

American Psychological Association. (1985). *Standards for Educational and Psychological Tests.* Washington, DC: American Psychological Association.

Arthur, S. & Nazroo, J.Y. (2003). Designing fieldwork strategies and materials. In: J. Ritchie & J. Lewis, J. (eds). *Qualitative Research Practice: A Guide for Social Science Students and Researchers*. London: Sage Publications, pp. 109–137

Baddely, A., Meeks Gardner, J. & Grantham-McGregor, S.M. (1995). Cross-cultural cognition: Developing tests for developing ountries. *Applied Cognitive Psychology*, 9, S173–S195.

Bayley, N. (1993). *Bayley Scales of Infant Development Manual*, 2nd edn. New York: The Psychological Association, Harcourt, Brace and Company.

Berry, J.W. (2011). *Cross-cultural Psychology: Research and Applications*. Cambridge: Cambridge University Press.

Black, M.M., Walker, S.P., Fernald, L.C.H., Andersen, C.T., DiGirolamo, A.M., Lu, C., … Grantham-McGregor, S. (2017). Advancing early childhood development: From science to Scale 1: Early childhood development coming of age: Science through the life course. *The Lancet*, 389(10064), 77–90.

85 Lynch, 2015.

Boivin, M.J., Gladstone, M.J., Vokhiwa, M., Birbeck, G.L., Magen, J.G., Page, C., … Taylor, T.E. (2011). Developmental outcomes in Malawian children with retinopathy-positive cerebral malaria. *Tropical Medicine and International Health*, 16(3), 263–271.

Boroditsky, L. (2001). Does language shape thought? Mandarin and English speakers' conception of time. *Cognitive Psychology*, 43, 1–22.

Bril, B. & Sabatier, C. (1986). The cultural context of motor development: Postural manipulations in the daily life of Bambara babies (Mali). *International Journal of Behavioural Development*, 9, 439–453.

Campbell, D.T. & Fiske, D.W. (1959). Convergent and discriminative validation by multi-trait and multi-method matrix. *Psychological Bulletin*, 56, 81–105.

Carter, J.A., Lees, J.A., Murira, G., Gora, J., Neville, B.G.R. & Newton, C.R.J.C. (2005). Issues in the development of cross-cultural assessments of speech and language for children. *International Journal of Language and Communication Disorders*, 40(4), 385–401.

Chimwaza, W., Chipeta, E., Ngwira, A., Kamwendo, F., Taulo, F., Bradley, S. & McAuliffe, E. (2014). What makes staff consider leaving the health service in Malawi? *Human Resources for Health*, 12, 17–17.

Cohen, J. (1960). A coefficient of agreement for nominal scales. *Educational and Psychological Measurement*, 20, 37–46.

Colbourn, T., Lewycka, S., Nambiar, B., Anwar, I., Phoya, A. & Mhango, C. (2013). Maternal mortality in Malawi, 1977–2012. *BMJ Open*, 3(12), e004150.

Cromwell, E.A., Dube, Q., Cole, S.R., Chirambo, C., Dow, A.E., Heyderman, R.S. & Van Rie, A. (2014). Validity of US norms for the Bayley Scales of Infant Development-III in Malawian children. *European Journal of Paediatic Neurology*, 18(2), 223–230.

Croteau-Chonka, E.C., Dean, D.C., 3rd, Remer, J., Dirks, H., O'Muircheartaigh, J. & Deoni, S.C. (2016). Examining the relationships between cortical maturation and white matter myelination throughout early childhood. *NeuroImage*, 125, 413–421.

Curran, H.V. (1984). *Nigerian Children: Developmental Perspectives*. Abingdon: Routledge & Kegan Paul.

Dean, D.C., 3rd, O'Muircheartaigh, J., Dirks, H., Waskiewicz, N., Walker, L., Doernberg, E., … Deoni, S.C. (2015). Characterizing longitudinal white matter development during early childhood. *Brain Structure and Function*, 220(4), 1921–1933.

Deoni, S.C., Dean, D.C., 3rd, Remer, J., Dirks, H. & O'Muircheartaigh, J. (2015). Cortical maturation and myelination in healthy toddlers and young children. *NeuroImage*, 115, 147–161.

Deoni, S. C., O'Muircheartaigh, J., Elison, J. T., Walker, L., Doernberg, E., Waskiewicz, N., … Jumbe, N. L. (2016). White matter maturation profiles through early childhood predict general cognitive ability. *Brain Structure and Function*, 221(2), 1189–1203.

Department of Nutrition & World Health Organization (WHO). (2006). WHO Motor Development Study: Windows of achievement for six gross motor developmental milestones. *Acta Paediatrica*, 450, 86–95.

Deregowski, J. B. & Serpell, R. (1971). Performance on a sorting task: A cross-cultural experiment. *International Journal of Psychology*, 6, 273–281.

Fernald, L.C., Kariger, P., Engle, P. & Raikes, A. (2009). *Examining Early Child Development in Low-Income Countries: A Toolkit for the Assessment of Children in the First Five Years of Life*. Retrieved from: http://siteresources.worldbank.org/EXTAFRREGTOPEDUCATION/Resources/444707-1291071725351/ExaminingECDtoolkitFULL.pdf

Fernandes, M., Stein, A., Newton, C.R., Cheikh-Ismail, L., Kihara, M., Wulff, K., … Newborn Growth Consortium for the 21st Century. (2014). The INTERGROWTH-21st Project Neurodevelopment Package: A novel method for the multi-dimensional assessment of neurodevelopment in pre-school age children. *PLOS ONE*, 9(11), e113360.

Frankenburg, W.K. & Dodds, J.B. (1967). The Denver developmental screening test. *Journal of Pediatrics*, 71(2), 181–191.

Frankenburg, W.K., Dodds, J.B., Archer, P., Shapiro, H. & Bresnick, B. (1990). *Denver II Technical Manual*. Denver, CO: Denver Developmental Materials Inc.

Gichuru, P. (2017). Development of robust scoring methods for use in child assessment tools. Doctoral disseration, Lancaster University.

Gilroy, K.E., Callaghan-Koru, J.A., Cardemil, C.V., Nsona, H., Amouzou, A., Mtimuni, A., … Bryce, J. (2013). Quality of sick child care delivered by Health Surveillance Assistants in Malawi. *Health Policy Plan*, 28(6), 573–585.

Giordani, B., Boivin, M.J., Opel, B., Nseyila, D.D. & Lauer, R. (1996). Use of the K-ABC with Children in Zaire, Africa: An evaluation of the sequential-simultaneous processing distinction within an intercultural context. I*nternational Journal of Disability, Development and Education*, 43(1), 5–24.

Gladstone, M., Lancaster, G., Jones, A., Maleta, K., Mtitimila, E., Ashorn, P. & Smyth, R.L. (2008). Can Western developmental screening tools be modified for use in a rural Malawian setting? *Archives of Diseases of Childhood*, 93, 23–29.

Gladstone, M., Lancaster, G.A., Umar, E., Nyirenda, M., Kayira, E., Van den Broek, N.R. & Smyth, R.L. (2010). The Malawi Developmental Assessment Tool (MDAT): The creation, validation, and reliability of a tool to assess child development in rural African settings. *PLOS Medicine*, 7(5), e1000273.

Gladstone, M., White, S., Kafulafula, G., Nielson, J. & Van den Broek, J. (2011). Post-neonatal mortality, morbidity and developmental outcome after ultrasound-dated preterm birth in rural Malawi: A case cohort study. Paper presented at the Royal College of Paediatrics and Child Health, Warwick.

Glick, J. (1975). Cognitive development in cross-cultural perspective. In F. Horowitz M. Hetherington & S. Scarr-Salanatek (eds). *Review of Child Development Research*, Vol. 4. Chicago, IL: University of Chicago Press.

Grantham-McGregor, S., Stewart, M.E. & Desai, P. (1978). A new look at the assessment of mental development in young children recovering from severe malnutrition. *Developmental Medicine and Child Neurology*, 20, 773–778.

Greenland, S. (1995). Dose-response and trend analysis in epidemiology: Alternatives to categorical analysis. *Epidemiology*, 6(4), 356–364.

Griffiths, R. (1986). *The Abilities of Babies,* Vol. 3. High Wycombe, Bucks: The Test Agency Ltd.

Griffiths, R. & Huntley, M. (1996). *GMDS 0-2. Griffiths Mental Development Scales, Revised: Birth to 2 Years*. Oxford: Hogrefe.

Harrison, A.J., Zimak, E.H., Sheinkopf, S.J., Manji, K.P. & Morrow, E.M. (2014). Observation-centered approach to ASD assessment in Tanzania. *Intellectual and Developmental Disabilities*, 52(5), 330–347.

Henry, J.V., Winters, N., Lakati, A., Oliver, M., Geniets, A., Mbae, S.M. & Wanjiru, H. (2016). Enhancing the supervision of community health workers with WhatsApp mobile messaging: Qualitative Findings From 2 Low-Resource Settings in Kenya. *Global Health, Science and Practice*, 4(2), 311–325.

Holding, P.A., Taylor, H.G., Kazungu, S.D., Mkala, T., Gona, J., Mwamiye, B., … Stevenson, J. (2004). Assessing cognitive outcomes in a rural African population: Development of a neuropsychological battery in Kilifi District, Kenya. *Journal of the International Neuropsychological Society*, 10(2), 246–260.

ICF International. (May 2016). *Malawi Demographic and Health Survey 2015–2016: Key Indicators Report*. Zomba, Malawi and Rockville, Maryland, USA. Retrieved from: https://dhsprogram.com/pubs/pdf/PR73/PR73.pdf

Jones, J. & Hunter, D. (1995). Qualitative research: Concensus methods for medical and health services research. *British Medical Journal*, 311, 376–380.

Kambalametore, S., Hartley, S. & Lansdown, R. (2000). An exploration of the Malawian perspective on children's everyday skills: Implications for assessment. *Disability and Rehabilitation*, 22(17), 802–807.

Kaufman, A.S. & Kaufman, N.L. (1983). *Kaufman Assessment Battery for Children*. Circle Pines, MN: American Guidance Service.

Kitzinger, J. (1995). Qualitative research: Introducing focus groups. *British Medical Journal*, 311, 299–302.

Konner, M. (1977). Infancy among the Kalahari Desert San. In P.H. Leiderman, S.R. Tulkin & A. Rosenfeld (eds). *Culture and Infancy: Variations in the Human Experience*. New York: Academic Press, pp. 287–328.

Kuruvilla, S., Bustreo, F., Taona, K., Mishra, C. K., Taylor, K., Fogstad, H., … Khosla, R. (2016). The Global Strategy for Women's, Children's and Adolescents' Health (2016–2030): A roadmap based on evidence and country experience. *Bulletin of the World Health Organization*, 94(5), 398–400.

Lancy, D.F. (2010). When nurture becomes nature: Ethnocentrism in studies of human development. *Behavioral and Brain Sciences*, 33(2–3), 99–100.

Landis, R. & Koch, G. (1977). The measurement of observer agreement for categorical data. *Biometrics*, 33, 159–174.

Lansdown, R. & Goldstein, H. (1992). Protocols I and II. The development and field testing of techniques for monitoring. Unpublished WHO document, MCH91 11.

Lansdown, R.G., Goldstein, H., Shah, P.M., Orley, J.H., Di Guo, D., Kaul, K.K., … Reddy, V. (1996). Culturally appropriate measures for monitoring child development at family and community level: A WHO collaborative study. *Bulletin of the World Health Organization*, 74(3), 283–290.

Lemeshow, S. & Hosmer, D. (1982). A review of goodness-of-fit statistics for use in the development of logistic regression models. *American Journal of Epidemiology*, 115(1), 92–106.

Levine, R.A. & New, R.S. (2008). *Anthropology and Child Development. A Cross-cultural Reader.* Oxford, UK.: Blackwell Publishing.

Lim, H.C., Chan, T. & Yoong, T. (1994). Standardisation and adaptation of the Denver Developmental Screening Test (DDST) and Denver II for use in Singapore children. *Singapore Medical Journal*, 35(2), 156–160.

Litwin, M.S. (2003a). *Reliability: How to Assess and Interpret Survey Psychometrics*, 2nd edn. Thousand Oaks, CA: Sage Publications, pp. 5–26.

Litwin, M.S. (2003b). *How to Assess and Interpret Survey Psychometrics*, Vol. 8. London: Sage, pp. 31–43.

Lloyd-Fox, S., Papademetriou, M., Darboe, M.K., Everdell, N.L., Wegmuller, R., Prentice, A.M., … Elwell, C.E. (2014). Functional near infrared spectroscopy (fNIRS) to assess cognitive function in infants in rural Africa. *Scientific Reports*, 4, 4740.

Luiz, D., Faragher, B., Barnard, A., Knoesen, N., Kotras, N., Burns, L.E. & Challis, D. (2006). *Griffiths Mental Development Scales: Extended and Revised (GMDS-ER): 28 Years. Technical Manual.* Amersham: Association for Research in Child Development (ARICD).

Lwanda, J. (2004). Politics, culture and medicine: An unholy trinity? Historical continuities and ruptures in the HIV/AIDS story in Malawi. In E.C. Kalipeni, S. Oppong & J. Ghosh (eds). *HIV and AIDS in Africa: Beyond Epidemiology*. Oxford: Blackwell Publishing.

Lynch, P. (2015–2018). *Improving Curriculum and Teaching Methods to Influence Policy and Increase the Quality of ECDE Provision for Children with Disabilities in Malawi*. Malawi: Economic and Social Research Council (UK).

Malawi Ministry of Gender. (2011). *Early Childhood Development Training Manual* (Revised edn). Retrieved from: https://www.globalgiving.org/pfil/13951/projdoc.pdf

Ministry of Gender. (2016). *Support to Early Child Develpment Programme*. Retrieved from: http://www.gender.gov.mw/index.php/2013-08-19-17-29-14/support-to-early-childhood-development-programme-secdp

Munthali, A.C., Mvula, P.M. & Silo, L. (2014). Early childhood development: The role of community based childcare centres in Malawi. *Springerplus*, 3, 305.

Murray-Kolb, L.E., Rasmussen, Z.A., Scharf, R.J., Rasheed, M.A., Svensen, E., Seidman, J.C., … Investigators, M.-E.N. (2014). The MAL-ED cohort study: methods and lessons learned when assessing early child development and caregiving mediators in infants and young children in 8 low- and middle-income countries. *Clinical Infectious Diseases*, 59(4), 261–272.

Neuman, M.J., McConnell, C. & Kholowa, F. (2014). From early childhood development policy to sustainability: The fragility of community-based childcare services in Malawi. *International Journal of Early Childhood*, 46(1), 81–99.

Newborg, J., Stock, J.R., Wnek, L., Guidubaldi, J. & Svinicki, J. (1984). *Battelle Developmental Inventory*: *Examiners Manual*. Allen, TX: DLMLINC Associates.

Nunnally, J.C. (1978). *Psychometric Theory*. New York: McGraw Hill.

Ochs, E. & Schieffelin, B.B. (1984). Language acquisition and socialization: Three developmental stories. In. R.A. Shweder & R.A. LeVine (eds). *Culture Theory: Essays on Mind, Self and Emotion*. Cambridge: Cambridge University Press, pp. 276–320.

Pastor, R. & Guallar, E. (1998). Use of two-segmented logistic regression to estimate change-points in epidemiological studies. *American Journal of Epidemiology,* 148(7), 631–642.

Payne, K.T. & Taylor, O.L. (2002). Multicultural influences on human communication. In N.B. Anderson & G.H. Shames (eds). *Human Communication Disorders. An Introduction,* 6th edn. Boston, MA: Allyn and Bacon.

Peet, E.D., McCoy, D.C., Danaei, G., Ezzati, M., Fawzi, W., Jarvelin, M. R., … Fink, G. (2015). Early childhood development and schooling attainment: Longitudinal evidence from British, Finnish and Philippine birth cohorts. *PLOS ONE*, 10(9), e0137219.

Perkins, D.N. & Deregowski, J.B. (1982). A cross cultural comparison of the use of a Gestalt perceptual strategy. *Perception*, 11, 279–286.

Phuka, J., Maleta, K., Thomas, M. & Gladstone, M. (2014). A job analysis of community health workers in the context of integrated nutrition and early child development. *Annals of the New York Acadamy of Science*, 1308, 183–191.

Powell, C.A., Walker, S.P., Himes, J.H., Fletcher, P.D. & Grantham-McGregor, S. (1995). Relationships between physical growth, mental development and nutritional supplementation in stunted children: The Jamaican study. *Acta Paediatrica*, 84, 22–29.

Prado, E.L., Abbeddou, S., Adu-Afarwuah, S., Arimond, M., Ashorn, P., Ashorn, U., … Dewey, K.G. (2016). Linear growth and child development in Burkina Faso, Ghana and Malawi. *Pediatrics*, 138(2), e2015698.

Prado, E.L., Abbeddou, S., Yakes Jimenez, E., Some, J.W., Ouedraogo, Z.P., Vosti, S.A., … Ouedraogo, J.B. (2016). Lipid-based nutrient supplements plus malaria and diarrhea treatment increase infant development scores in a cluster-randomized trial in Burkina Faso. *Journal of Nutrition*, 146(4), 814–822.

Prado, E.L., Abubakar, A.A., Abbeddou, S., Jimenez, E.Y., Some, J.W. & Ouedraogo, J.B. (2014). Extending the Developmental Milestones Checklist for use in a different context in Sub-Saharan Africa. *Acta Paediatrica*, 103(4), 447–454.

Prado, E.L., Adu-Afarwuah, S., Lartey, A., Ocansey, M., Ashorn, P., Vosti, S.A. & Dewey, K.G. (2016). Effects of pre- and post-natal lipid-based nutrient supplements on infant development in a randomized trial in Ghana. *Early Human Development*, 99, 43–51.

Prado, E.L., Maleta, K., Ashorn, P., Ashorn, U., Vosti, S.A., Sadalaki, J. & Dewey, K. G. (2016). Effects of maternal and child lipid-based nutrient supplements on infant development: A randomized trial in Malawi. *American Journal of Clinical Nutrition*, 103(3), 784–793.

Riethmuller, A.M., Jones, R. & Okely, A.D. (2009). Efficacy of interventions to improve motor development in young children: A systematic review 4. *Pediatrics*, 124(4), e782–e792.

Sabanathan, S., Wills, B. & Gladstone, M. (2015). Child development assessment tools in low-income and middle-income countries: How can we use them more appropriately? *Archives of Disease in Childood*, 100(5), 482–488.

Serpell, R. (1976). *Culture's Influence on Behaviour*. London: Methuen and Company.

Serpell, R. (1979). How specific are perceptual skills? A cross-cultural study of pattern reproduction. *British Journal of Psychology*, 70(3), 365–380.

Serpell, R. (2000). Intelligence and culture. In R.J. Stenby (ed.). *Handbook of Intelligence*. New York: Cambridge University Press, pp. 549–580.

Slobin, D.I. (1991). Learning to think for speaking: Native language cognition and rhetorical style. *Pragmatics*, 1, 7–26.

Streiner, D.L. (2003). Starting at the beginning: An introduction to coefficient alpha and internal consistency. *Journal of Personality Assessment*, 80(1), 99–103.

Streiner, D.L. & Norman, G.R. (2008), *Health Measurement Scales: A Practical Guide to their Development and Use*, 4th edn. New York: Oxford University Press, Chapter 8 (Reliability).

Super, C.M. (1976). Environmental effects on motor development: The case of 'African infant precocity'. *Developmental Medicine and Child Neurology*, 18, 561–567.

United Nations Children's Fund (UNICEF). (2012). *Cities and Children: The Challenge of Urbanisation in Tanzania*. Retrieved from Dar es Salaam, United Republic of Tanzania: https://www.unicef.org/infobycountry/files/Cities_and_Children_-_FINAL.pdf

Van Hensbroek, M.B., Palmer, P., Jaffar, S., Schneider, G. & Kwiatkowski, D. (1997). Residual neurolgic sequelae after childhood cerebral malaria. *Journal of Paediatrics*, 131(125), 129.

Vygotsky, L.S. (1961). *Thought and Language*. Boston, MA: MIT Press.

Warren, N. & Parkin, J.M. (1974). A neurological and behavioral comparison of African and European newborns in Uganda. *Child Development*, 45, 966–971.

Wober, M. (1972). Culture and the concept of intelligence: A case in Uganda. *Journal of Cross Cultural Psychology*, 3(3), 327–328.

World Bank. (2011). *Development Data – Malawi.* Retrieved from: http://data.worldbank.org/country/malawi

World Bank. (2014). *Protecting Early Child Development in Malawi (PECD): Baseline Survey, Midline and Endline Evaluation.* Retrieved from: http://catalog.ihsn.org/index.php/catalog/5867/study-description

World Bank. (2016a). *Development Data: Malawi*. Retrieved from: http://data.worldbank.org/country/malawi

World Bank. (2016b). *Malawi National Education Profile 2014 Update*. Washington, DC: World Bank. Retrieved from: http://www.epdc.org/sites/default/files/documents/EPDCNEP_Malawi.pdf

World Bank. (2018). *Poverty and Equity Data Portal, Malawi Country Indicators*. Retrieved from: http://povertydata.worldbank.org/poverty/country/MWI (accessed 18 January 2018).

Yalaz, K. & Epir, S. (1983). The Denver Developmental Screening Test: Normative data for Ankara children. *Turkish Journal of Pediatrics*, 25(4), 245–258.

You, D., Hug, L., Anthony, D. & United Nations Children's Fund. (2014). *Generation 2030/Africa*. Retrieved from: https://liverpool.idm.oclc.org/login?url=http://search.ebscohost.com/login.aspx?direct=true&db=eric&AN=ED560027&site=eds-live&scope=site

Yousafzai, A.K., Rasheed, M.A., Rizvi, A., Armstrong, R. & Bhutta, Z.A. (2015). Parenting skills and emotional availability: An RCT. *Pediatrics*, 135(5), e1247–1257.

Zelazo, N.A., Zelazo, P.R., Cohen, K.M. & Zelazo, P.D. (1993). Specificity of practice effects on elementary neuromotor patterns. *Developmental Psychology*, 29, 686–691.

Chapter 11

Psychological developments and their correlates in sub-Saharan Africa

Penny A. Holding & Jean C. Fotso

Background and justification

The United Nations has projected that the world's urban population will increase by 2.3 billion before 2050, with more than 90 per cent of this growth taking place in the least industrialised countries.[1] A significant proportion of these urban dwellers, 62 per cent of whom are in sub-Saharan cities, will experience a low standard of living characterised by crowded and poorly constructed dwellings, poor water supply, sanitation and insecurity of tenure and employment.[2] Income constraints, price barriers and a lack of alternative food sources contribute to increased health risks and deprive the urban poor of access to health care, despite their close proximity to health-care facilities.[3] In this landscape, the consequences for poor physical health are disproportionally felt by the very young and the very old.[4] Both mortality and morbidity are affected, with lower levels of immunisation and a higher risk of fever and diarrhoea observed among the children growing up in informal settlements.[5] In Kenya, for example, under-five mortality is significantly higher in the urban informal settlements of Nairobi than in the rural areas.[6] The consequences of ill health go beyond developmental issues captured in morbidity and mortality statistics. Early childhood diarrhoea, for example, is associated with long-term cognitive deficits.[7] The harsh physical and social conditions experienced by those living in informal settlements have other psychological consequences. Chronic stress, for example, is manifested in the high levels of depression recorded in community-based studies among the urban poor.[8] Parental stress and depression, particularly when associated

1 United Nations (UN), 2014.
2 UN, 2014.
3 Fotso et al., 2009, pp. 130–137.
4 Kyobutungi et al., 2008, p. 1.
5 Abuya et al., 2011, pp. 1389–1399.
6 APHRC, 2002; et al., 2011, pp. 381–400.
7 Niehaus et al., 2002, pp. 590–593.
8 Montgomery et al., 2003.

with multiple risks, is in turn associated with adverse consequences for child cognitive development.[9]

There is a complex interrelationship between poverty, disease and cognitive development.[10] The pathways from poverty to poor child development and back to poverty have been well characterised by Walker and colleagues[11] in a model that identifies the independent and interdependent contributions of biological, sociocultural and psychosocial risk factors. In this model, poverty exerts a negative influence on development through restrictions on resources, both in terms of access and quality, as well as exposure to dangerous and stressful physical or social environments.[12] Poverty, therefore, involves a complex array of factors, both distal and proximal, with multiple and overlapping pathways of influence, creating a wide variability in outcome.[13]

The relationship between risk and outcome may differ depending on the level of risk experienced. An example is provided by Santos et al. (2008), using a five-stage model, which considered nutrition/infection, psychosocial stimulation, family status, material resources and the physical environment, to examine the relationship between poor sanitation and cognitive outcome in younger children.[14] In communities where infection levels were low, poor sanitation was identified as exerting a significant main effect on cognitive outcome. In areas of high levels of infection, the relative contribution of poor sanitation was reduced. Understanding local conditions is essential when selecting potential interventions.

Improving the conditions for optimal child development is enshrined in five of the Sustainable Development Goals (SDGs): SDG 1: No poverty of income, services, resources and participation in decision-making, with the text acknowledging the specific vulnerability of children; SDG 2: Zero hunger; SDG 3: Good health and well-being; SDG 4: Quality education; SDG 5: Gender equality. A failure to attain these goals will likely limit intellectual, emotional and social development and impact on the attainment of the remaining goals, which target improved environmental economic and sociocultural opportunities. The SDGs speak directly to the importance of context and to the intergenerational effects of limited resources. Changing lives will alter the potential of those who are now children, intentionally improving their ability as parents and community leaders, which would, in turn, increase the potential for the attainment of the SDGs themselves.[15]

9 Bernard-Bonnin, 2004, pp. 575–583; Evans et al., 1998, pp. 1514–1523; Galler et al., 2000, pp. 747–757; Kurstjens & Wolke, 2001, pp. 623–636; Wanless et al., 2008, pp. 134–141.

10 Agarwal & Srivastava, 2009, pp. 68–89; Agarwal & Taneja, 2005, pp. 233–244; Holding & Snow, 2001, pp. 68–75; Soukaloun et al., 2003, pp. 181–186; Teklehaimanot & Mejia, 2008.

11 Walker et al., 2007, pp. 145–157.

12 World Health Organization (WHO), 2007.

13 Bronfenbrenner & Morris, 1998, pp. 993–1028.

14 Santos et al., 2008, p. 202.

15 Engle, 2007, pp. 229–242.

In this chapter, we are concerned with children growing up in informal settlements in sub-Saharan Africa and identifying the factors that contribute to variability in cognitive outcome; that is, an understanding not only of potential risk, but also of factors that support resilience. A reflection on the changing evidence base and the development of appropriate methodologies will come from an examination of the literature, while an investigation of specific contextual issues is carried out through an exploratory analysis of factors affecting the behaviour and performance of children growing up in two informal settlements in Nairobi, Kenya.

Influences on cognitive development in sub-Saharan Africa

For the period 2005–2010, a literature search was carried out using the following databases: PubMed, Google Scholar, Questia, Scopus, ISI Web of Knowledge and EBSCO. The search terms included a combination of 'child development', 'cognition', 'Africa' and 'urban'. Additional references were identified through the ancestry method (references cited in identified articles). We used online abstracts to identify potentially eligible studies, for which a print version was obtained. Studies were included if they met the following criteria:

- Location: conducted in sub-Saharan Africa.
- Focus: primarily focused on determining the impact of a defined risk to development or benefits of an intervention to promote optimal development.
- Content: a psychological/developmental variable was a main outcome measure.
- Study focus on children younger than 18 years.
- Details given on the assessment tools used.

This process was repeated for the period 2011–2016 on PubMed, using the same search terms, with the additional term 'psychological' added.

In the period 2005–2010 (Timeframe 1) only 28 publications were identified, emanating from 23 separate study populations. The results are summarised in four tables providing study descriptions focusing on design, test measures and outcome under the following categories:

- Studies of malaria (see Table 11.1)
- Studies of HIV (Table 11.2)
- Studies of nutrition and of other health conditions (Table 11.3)
- Studies investigating socio-economic status (SES) (Table 11.4).

Each of these tables is divided such that the top section lists articles focusing on epidemiological issues and/or the characterisation of the risk factors of interest (18/28). The lower section of the table lists those evaluating interventions or treatment (10/28). In summarising each section, we concern ourselves with the contribution to the

understanding of the impact of the risk factors themselves, as well as the implications for the design and structure of future investigations.

Health/medical issues were addressed in most studies, with the effects of malaria and HIV being the most widely studied. Urban residents were the prime target in only nine of the publications. However, none specifically addressed the risk factors associated with urban living. There were also no published studies on issues related to reproductive health, abuse or trauma, acknowledged risk factors for impaired psychological development and economic attainment.

In the period 2011–2016 (Timeframe 2), 37 publications were identified from 32 separate study populations. Of these, 27/37 examined outcomes related to biomedical conditions, and a further four investigated interventions designed to ameliorate the potential consequences of these conditions. The increased number of studies covered a broader range of health issues compared to the previous five years, although HIV remained a major, if not primary, concern. There was an increase in the number of studies reporting on the social and emotional contexts, on the behavioural components of child development, as well as on the design of family based programmes to stimulate improved development. In studies on issues related to reproductive health, abuse and trauma, acknowledged risk factors for impaired psychological development and economic attainment have begun to emerge in the literature from sub-Saharan Africa. Another change is that half the studies that reported on their context were undertaken in urban settings (18), although the contribution of context to understanding different stressors and factors that support risk and resilience remains underreported.

Search results for the period 2011–2016 are summarised in six tables, reflecting the broadening of the research themes.

- Infections, including malaria (see Table 11.5)
- HIV (Table 11.6)
- Nutrition (Table 11.7)
- Other health conditions (Table 11.8)
- Social development (Table 11.9)
- Interventions and intervention techniques (Table 11.10)

Table 11.1: Studies relating cognitive development to malaria in children

Main focus of study	Main author	Publication date	Location	Sample size Age at risk/intervention vs comparison group	Neurocognitive measures	Outcome summary
Study 1: Neurocognitive sequelae of severe malaria, particularly language	Carter et al.	2005 a, b, & 2006	Kenya rural	N=308 vs 179 (3) 6–9.11 years	Locally adapted tests of memory, attention, language, non verbal functioning	Outcome related to severity and type of symptoms—language most pervasive
Impaired memory & severe malaria	Kihara et al. Boivin et al.	2009 2007			Adapted test of everyday attention	Differential features of disease associated with different outcomes Impairments in working memory-attention at 6 months after discharge
Study 2: Prospective follow-up of cerebral malaria	John et al.	2008	Uganda urban	N=44 vs 143 (3) 5–12 years	K-ABC Test of Variables of Attention (TOVA) Tactile Performance Test (TPT)	Diffuse impairments & impairment of attention seen at 2 years post exposure
Study 3: Malaria with neurological involvement & event-related potential	Kihara et al.	2010	Kenya rural	N=54 (1) 6–7 years	ERPs—Auditory & visual paradigms	Evidence of neurophysiological effects of disease exposure
Intervention studies						
Study 1: Long-term impact of malaria chemoprophylaxis	Jukes et al.	2006	Gambia, rural	N = 291 vs 288 (2) 14–19 year	Battery of tests incl. Raven's, attention, memory, etc. Educational attainmen	Possible long-term prophylactic effects, differing by gender
Study 2: Severe malaria & prophylaxis for seizures	Abubakar et al.	2007	Kenya. rural	N = 76 vs 80 11 months–9 years	Kilifi Developmental Inventory	No benefits on psychomotor development of receiving seizure prophylaxis during acute phase
Study 3: Treatment of mild malaria & effects of health & education	Clarke et al.	2008	Kenya, rural	N = 2 604 vs 2 302 (2) 5–18 years	Sustained attention from the Teach Classroom observations Educational attainment	Benefits in sustained attention & health, but not in behaviour or educational attainment
Study 4: Benefits of computerised cognitive rehabilitation on cerebral malaria survivors	Bangirana et al.	2009	Uganda, urban	N = 32 v 33 (2) 7–12 years	Cognitive status Child Behaviour Checklist (CBC)	Intervention effects found in some domains; the validity of the benefits is yet to be evaluated

Source: Compiled by the authors

Table 11.2: Studies relating cognitive development to HIV infection in children

Main focus of study	Main author	Publication date	Location	Sample size Age at risk/intervention vs comparison group	Neurocognitive measures	Outcome summary
Study 1: HIV-infected ARV naïve	Bagenda et al.	2006	Uganda urban	N = 28 vs 79 (3) 6–12 years	Kaufman-Assessment Battery for Children WRAT-3	Greater number of health events, but no significant differences in neurocognition
Study 2: Measuring delay in ARV naïve HIV infected children	Ballieu & Potterton	2008	South Africa urban	N = 40 (1) 18– 30 months	Baley Scales of Infant Development (BSI) II	Delays noted in motor, language & cognition
Study 3: Monitoring HIV infected children for support	Abubakar et al.	2009	Kenya rural	N= 31 vs 17 vs ref population 6 – 35 months	ERPs—Auditory & visual paradigms	Disease stage & weight-for-age account for significant variability in psychomotor outcome
Study 4: Impact of HIV on development	Van Rie et al.	2008	DRC urban	N=70 (35 infected) vs 90 (3) 18–72 months	BSI II Rossetti Infant Toddler Language Scale Peabody Psychomotor Development Index Snijders-Oomen Non-Verbal Intelligence Scale	Effects in all domains associated with infection and exposure
1: Initiating medical care				N=70 (35 infected) vs 90 (3) 18–72 months		Treatment reduces gap between infected, uninfected & unexposed children, particularly in motor development
2: HIV infected—home visiting programme	Potterton et al.	2010	South Africa urban	N=122 (2) <2.6 years	BSI II	Significant improvement observed in intervention group in both motor & cognitive development

Source: Compiled by the authors

Table 11.3: Studies relating cognitive development to nutrition and other health conditions in children

Main focus of study	Main author	Publication date	Location	Sample size Age at risk/intervention vs comparison group	Neurocognitive measures	Outcome summary
Study 1: HIV-infected ARV naïve	Bagenda et al.	2006	Uganda urban	N = 28 vs 79 (3) 6–12 years	Kaufman-Assessment Battery for Children WRAT-3	Greater number of health events, but no significant differences in neurocognition
Study 2: Measuring delay in ARV naïve HIV infected children	Ballieu & Potterton	2008	South Africa urban	N = 40 (1) 18– 30 months	Baley Scales of Infant Development (BSI) II	Delays noted in motor, language & cognition
Study 3: Monitoring HIV infected children for support	Abubakar et al.	2009	Kenya rural	N= 31 vs 17 vs ref population 6–35 monthss	ERPs—Auditory & visual paradigms	Disease stage & weight-for-age account for significant variability in psychomotor outcome
Study 4: Impact of HIV on development	Van Rie et al.	2008	DRC urban	N=70 (35 infected) vs 90 (3) 18–72 months	BSI II Rossetti Infant Toddler Language Scale Peabody Psychomotor Development Index Snijders-Oomen Non-Verbal Intelligence Scale	Effects in all domains associated with infection and exposure
1: Initiating medical care				N=70 (35 infected) vs 90 (3) 18–72 months		Treatment reduces gap between infected, uninfected & unexposed children, particularly in motor development
2: HIV infected—home visiting programme	Potterton et al.	2010	South Africa urban	N=122 (2) <2.6 years	BSI II	Significant improvement observed in intervention group in both motor & cognitive development

Source: Compiled by the authors

Table 11.4: Studies relating cognitive development to socio-economic status in children

Main focus of study	Main author	Publication date	Location	Sample size Age at risk/intervention vs comparison group	Neurocognitive measures	Outcome summary
Study 1:Background & classroom correlates	Daley et al.	2005	Kenya rural	N = 555 (12 schools) 6 .07–8.85 years	Verbal Meaning Test Arithmetic Observation Teacher ratings	Child, home & school factors all exert significant influence. School quality important
Study 2: Effect of health status & the educational infrastructure	Bhargava et al.	2005	Tanzania, peri-urban & rural	N = 680 (10 schools) 9–15 years	3 locally adapted dynamic tasks 8 static & achievement tests	Outcome variability associated with school attendance, height, haemoglobin & teaching quality
Study 3: Correlates of psychomotor development	Abubakar et al.	2008	Kenya rural	N = 204 (1) 24–35 months	Kilifi Developmental Inventory	Nutrition & not SES predictive indicator in infancy
Study 4: Socio-economic predictors in normal population	Bangirana et al.	2009	Uganda urban	N =89 (1) 5–12 years	K-ABC TOVA TPT MC-HOME	No universal predictor, different background factors are related to different outcomes

Source: Compiled by the authors

Table 11.5: Association of infection with child development outcomes relating cognitive development to socio-economic status in children

	Publication date	Primary focus/objective	First author	Location	Age	N	Content/outcome measures	Study summary
1	2013	Association of child development outcomes with parasitemia	Fink	Zambia Urban, rural, peri-urban	5–6 yrs	1,41	Measures from the Zambia Early Childhood Development Project (ZECDP), school readiness, language & social emotional development	Levels of early childhood parasitemia show greater association with test-taking ability and parental report on beahvioural development, larger than those with education and wealth
2	2016	To assess the effect of exposure to malaria and the mediation effect of anaemia	Bolvin	Tororo, Uganda rural	2–3 yrs	468,453	Mullen Scales of Early Learning (MSEL)	Early bouts of maleria can diminish cognitive development, partly mediated by anaemia, and cognitive development risk greater in children exposed to HIV in utero
3	2015	Association between maternal helminth infection and child development	Mireku	Alada, Benin (not described)	12 months	635	Mullen Scales of Early Learning (MSEL) Home Observation Measurement of the Environment (HOME), Eurofit physical fitness test battery	Infection at first ANC visit associated with poorer infant cognitive and gross motor functions at the age of one year
4	2014	To assess the short-term dynamics of development after two rounds of de-worming	Hurlemann	Niablé, Côte d'Ivoire Rural	5–6 yrs	257	Code transmission 'Tests of Everyday Attention for Children' (TEA-Ch) the forward digit span test, a subtest of the 'Wechsler Intelligence Scale for Children' – 4th Edition (WISC-IV)	Results variable, highlighting the need to look at interactions and sub-groups

Source: Compiled by the authors

Table 11.6: Association of HIV with child development outcomes, post 2010

	Publication date	Primary focus/objective	First author	Location	Age	N	Content/outcome measures	Study summary
1	2012	Development of HIV-infected ARV naïve children vs uninfected children	Ruel	Kampala, Uganda Urban, peri-urban	6–12 yrs	93 vs 106	Test of Variables of Attention (TOVA), Kaufman Assessment Battery for Children, 2nd edn (KABC-2), Bruininks-Oseretsky Test of Motor Proficiency, 2nd edn (BOT-2)	Significant motor & cognitive deficits were found in HIV-infected ART-naïve children with high CD4 cell counts
2	2014	Assessing the impact of ART initiation & duration on neurodevelopment	Brahmbhatt	Rakai, Uganda (Not described)	0–6 yrs	329 mother–child pairs	Mullen Scales of Early Learning (MSEL) TQ10 screening test	Longer duration on ARTs was associated with a reduced risk of impairment
3	2016	Relationship between HIV exposure & executive function	Ezeamama	Kampala, Uganda Urban, peri-urban	6–18 yrs	166 (53 controls, 55 uninfected, 58 infected)	Behaviour Rating Inventory of Executive Function (BRIEF). Perceived social standing, the MacArthur Scale	Exposure associated with development of executive function, parental & self-report providing different outcome profiles
4	2016	Association perinatal exposure & psychosocial adjustment (PA)	Zalwango			168 (54 controls, 56 uninfected, 58 infected)	Psychosocial adjustment (depressive symptoms, distress, hopelessness, positive future orientation & esteem)	Perinatal HIV status associated with differences in PA suggesting need for more holistic support service
5	2014	Pattern of psychosocial well-being following parental loss	Nabunya	South Western Uganda Rural	10–16 yrs	1,410	Questionnaire on effects of parental loss & changes in child's life	Negative impact on quality of life & general affect
6	2014	Examining the relationship between orphans' emotional difficulties & their learning	Escueta	Ethiopia, Kenya, Tanzania (India, Cambodia)	7–11 yrs	300, 300, 302 (by country)	Kaufman Assessment Battery for Children, California Verbal Learning Test Strengths & Difficulties Questionnaire (SDQ)	Negative & significant relationship between emotional difficulties & cognitive development found within each orphan subgroup
7	2016	Gender effects on functioning in HIV-affected children	Hensels	South Africa, Malawi <50 % urban	14–13 yrs	989	Child Status Index (CSI)	Boys have poorer outcomes from early in the experience, which remain over time, but the gap does not seem to broaden
8	2016	Enhancing a caregiver's sensitivity & attentiveness to improve child cognitive & social development	Bass	Tororo & Busia, Eastern Uganda Rural	2–4 yrs	339 child–caregiver dyads (118 infected & 221 uninfected children)	HOME Mullen Scales of Early Learning Colour Object Association Test (COAT) Hopkins Symptoms Checklist-25	Caregiving quality adds to the understanding of the complex home environments in the context of poverty & HIV that might impact a child's neurodevelopment

Source: Compiled by the authors

Table 11.7: Nutrition and child development outcomes, post 2010

Publication date	Primary focus/objective	First author	Location	Age	N	Content/outcome measures	Study summary
2013	Nutritional status as a mediator of limited resources on language skills, motor abilities & cognitive functioning	Kitsao-Wekulo	Kilifi, Kenya Rural	6–11 8rs	308	Executive function battery: Tower Test, Self-Ordered Pointing Test, Verbal List Learning, Dots, Contingency Naming Test, Score, People Search. Coloured Progressive Matrices (CPMs) Confrontational Naming (KNT), Motor skills	Nutritional status remains an important mediator, even at school age
2013	Measuring resilience to risks of early stunting	Crookston	Nationwide sampling Ethiopia (India, Peru, and Vietnam) Urban, rural	follow-up at 8 yrs	1,757	Early Grade Reading Assessment (EGRA), Maths tests Peabody Picture Vocabulary Test	Describing continuities & discontinuities, with persistent stunting worse than those who catch up
2014	Influence of families on cognitive development	Crookston	Nationwide sampling Ethiopia (India, Peru, and Vietnam) Urban, rural	follow-up at 14–15 yrs	86	Behaviour Rating Inventory of Executive Function (BRIEF). Perceived social standing, the MacArthur Scale	Parental schooling, household wealth & child growth are associated with cognitive achievement in adolescence
2013	Association between infant breast-feeding & school grade successfully completed	Horta	Joburg, SA (Brazil, India, Guatemala, Philippines) Urban	17 yrs	1998	Highest school grade achieved	Early advantage associated with breastfeeding does not translate into long-term educational achievement; intervening effects may be greater
2014	Examining the pathways from food insecurity to mental health	Jebena	Jimma, Ethiopia Rural	17–21 yrs	1,521	Self-Reporting Questionnaire (SRQ-20)	Youths living in urban areas had a higher chance of developing common mental disorders than their rural counterparts
2014	Longer-term associations of exclusive breast-feeding (EBF)	Rochat	South Africa, Rural	7 –11 yrs	1,521	Executive function domain of NEPSY-II Child Behaviour Checklist (CBCL), Home observation for measurement of the environment	EBF associated with fewer than average conduct disorders & a weaker association with improved cognitive development in boys
2016	Association of anthropometric characteristics, iron biomarkers, & serum Se with cognitive performance	Gashu	Amhara, Ethiopia Rural	54 –60 months	541	Wechsler Preschool and Primary Scale of Intelligence (WPPSI-III), Matrix reasoning	Highlights the important interaction between ecological factors & risks to growth & development

Source: Compiled by the authors

Table 11.8: Neonatal risk and other chronic conditions, post 2010

	Publication date	Primary focus/objective	First author	Location	Age	N	Content/outcome measures	Study summary
1	2012	Investigation of factors associated with behavioural problems in children with epilepsy	Kariuki	Kilifi, Kenya Rural	6–7 years	108 vs 108 without epilepsy	Child behaviour questionnaire for parents Category fluency information Picture vocabulary , Construct-a-man Matching familiar figures construction	Active epilepsy, cognitive impairment & focal seizures were the most significant independent covariates of behavioural problems
2	2012	Assessing prevalence of neurological impairment & evaluate risk factors of neurological impairment	Kawakatsu	Nyanza, Kenya Rural	6–9 years	6 263	Ten questions questionnaire , Digit span , Corsi Block , Verbal fluency , Silly sentences, Visual search , Free recall, Vocabulary learning	Poverty, a greater number of children, older maternal age & no maternal tetanus shot were risk factors of NI
3	2015	Describing the developmental profile of children attending clinics screening for cerebral palsy	Kakooza-Mwesige	Kampala Urban	2–12 years	135	Ten Questions Questionnaire Surveillance for Cerebral Palsy in Europe	Higher occurrence of birth asphyxia or postnatal-acquired infections in children screened positive for CP
4	2013	Examining influences on academic performance in those with sickle cell anaemia	Ezenwosu	Enugu, Nigeria (not described)	5–11 years	90 v 90	Draw-a-person	Absenteeism had no association with performance, while SES & general abilities did
5	2015	Describing the psychosocial profile of children attending clinics for management of bronchial asthma	Tunde-Ayinmode	Ilorin, Kwara state, North-central Nigeria Urban	7–14 years	75	Child Behaviour Questionnaire (Rutter Scale)	Descriptive study identifies need for holistic treatment programmes to include psychological interventions
6	2013	Association between maternal factors & longer-term effects of prenatal exposure to alcohol	May	Western Cape Province Urban/rural	9 years	561	Raven Coloured Progressive Matrices Test for the Reception of Grammar Personal Behaviour Checklist (PBCL)	Results are strongly suggestive of the potential benefits of early intervention creating resilience. Urban residence was protective
7	2014	Association of early emotional withdrawal with later emotional development and foetal alcohol spectrum	Molteno	Cape Town Urban	5 and 9 years	144	EAS Temperament Survey Play interactions Junior South African Individual Scales The Wechsler Intelligence Scales for Children, 4th edn. Draw-a-person test	Foetal alcohol exposure contributed independently to infant withdrawal over & above the contribution of maternal sensitivity

Source: Compiled by the authors

Table 11.9: Social factors, post 2010

	Publication date	Primary focus/objective	First author	Location	Age	N	Content/outcome measures	Study summary
1	2014	Exposure to community violence leads to violence in childrearing, in turn predicting greater externalising behaviours	Skinner	Kisumu, Kenya Urban, peri-urban	7–9 years	100	Post-election violence exposure survey Multiple Indicator Cluster Survey Parent–Child Conflict Tactics Scale Self-Report – Achenbach Child Behaviour Checklist	The predicted pathways not seen. Measures used felt not to reflect local concepts of negative and positive behaviours
2	2014	The influence of gender, age and emotion regulation on coping among university students in Botswana	Monteiro	Gabarone, Botswana	18–29 years	128	Difficulties in Emotion Regulation Scales Coping Strategies Inventory	Differences are needed in the approach to providing support, to take into account individual approaches, gender & age
3	2016	Relationship between daily living activities & exposure to sexual violence in girls	Amone-P'Ola	Northern Uganda Rural	18–25 years	210	African Youth Psychosocial Assessment Instrument	Effect sizes are small but suggest a mediation model through stigma
4	2016	Effects of problem-solving interventions on aggressive behaviours in boys	Abdulmalik	Ibadan Urban	9–14 years	20 v 20	Teacher-rated aggressive behaviour Self-rated aggression scale, Strengths and Difficulties Questionnaire Attitude Towards Aggression Questionnaire Social Cognition and Attribution Scale	Tracking pathway to change requires looking at differential effects in sub-groups & changes in caregiver behaviour on the route to overall change

Source: Compiled by the authors

Table 11.10 : Interventions and intervention techniques, post 2010

	Publication date	Primary focus/objective	First author	Location	Age	N	Content/outcome measures	Study summary
1	2012	Comparison of neurodevelopmental outcomes in infants (receiving resuscitation vs not requiring)	Carlo	Zambia, Pakistan, India Rural	Follow up at 12 months	405, breakdown not provided by country	Bayley Scales of Infant Development – II Ages and Stages Questionnaire, 2nd edn	No differences observed
2	2013	Randomised trial of early developmental intervention (EDI) on outcomes in children after birth asphyxia	Carlo	Zambia, Pakistan, India Rural	0–36 months	405, breakdown not provided by country	Bayley Scales of Infant Development – II Ages and Stages Questionnaire, 2nd edn	EDI benefits general development of children receiving resuscitation & the psychomotor development of those who did not
3	2015	Differential impact of EDI on different outcomes and risks	Wallender	Zambia, Pakistan, India Rural	0–36 months	405, breakdown not provided by country	Bayley Scales of Infant Development – II Ages and Stages Questionnaire, 2nd edn	Impact of EDI overall benefits cognition more than psychomotor development
4	2014	Exploring the process of EDI; dosage levels	Wallender	Zambia, Pakistan, India Rural	0–36 months	405, breakdown not provided by country	Bayley Scales of Infant Development – II Ages and Stages Questionnaire, 2nd edn	Length of, number of sessions & the intensity of delivery all had an association with effectiveness
5	2015	Impact on child language & attention of providing training in dialogic book-sharing to caregivers	Vally	Khayelitsha, South Africa Peri-urban	14–16 months	49 v 42	MacArthur-Bates Communicative Development Inventory Peabody Picture Vocabulary Test Revised Early Childhood Vigilance Task	Moderate benefits on infant lexical production, large magnitude on infant comprehension, as assessed by parent report, substantial improvement in attention
6	2016	Impact of home visiting intervention on attachment, security & infant cognition	Murray	Khayelitsha, South Africa Peri-urban	18 months	127 v 136	Bayley Scales of Infant Development – II , no description of measure of attachment	No overall effect on infant cognition, in contrast to its benefit to attachment
7	2015	The association between literacy levels & health ratings	Smith Greenaway	Balaka, Malawi Urban/rural	17 –27 years	1 659	Card-matching Self-ratings Length of schooling	Schooling levels & functional literacy associated with better health

Source: Compiled by the authors

Table 11.11: Children's background characteristics

Variables[1]		**%**	**N**
Orphan status	Non-orphan	62.3	742
	Orphan	37.7	449
Gender	Male	47.1	561
	Female	52.9	630
Age	6–9	30.4	362
	10–12	38.9	463
	13–14	30.7	366
Number of other children in the household[2]	0–1	32.3	385
	2–3	41.4	493
	4+	26.3	313
Educational level of the household head	None	20.3	242
	Primary	57.0	679
	Secondary	22.7	270
Area of residence	Korogocho	75.5	899
	Viwandani	24.5	292
Totals (N=1 191)			1 191

1 These include household wealth tertiles (not shown)

2 Aged less than 15 years

Source: Compiled by the authors

Tracking infection, disease and development The lessons learnt from:

Malaria and helminth infections

The six published papers in Timeframe 1 on the impact of severe malaria on cognitive development stem from only three separate studies, all carried out in East Africa.[16] Impaired outcome appears in the main to result from neurological involvement, including coma, hypoglycaemia and seizures,[17] although an intervention targeted at seizure control showed no protection against the development of cognitive impairments.[18] In summary, these studies identified specific vulnerabilities, which, in turn, have suggested relevant intervention and remediation programmes. Preventative measures taken against the potential effects, the focus of two studies, certainly demonstrated improved health outcomes.[19]

In relation to cognitive development, the benefits of intervention were variable, possibly mediated through the effects on school attendance. The long-term effects of mild, though chronic, infection are less well characterised, as the effects sizes are small, requiring large sample sizes to detect them. More recent studies, from Timeframe 2, support the broadening of the elements of development that are monitored, increasing our understanding of the impact of disease on a more holistic concept of the development of human capacities. All the populations lived in conditions of poverty, making it possible that outcomes might be a consequence of the synergistic effect of multiple exposures,[20] although more recent data suggest an independent contribution of biological and social pathways. Early limitations on the ability to explore both within and between group variability are a consequence of study design issues such as restricted sample size, the use of matched samples and limited exploration of interaction models, and are slowly being addressed.

HIV infection

Reviews on HIV exposure suggest that the pattern of impairment following exposure to HIV is variable depending on age at assessment, treatment exposure, disease stage, area of cognition measured and the assessment used. The studies identified in Table 11.2 support this overall picture of variability in outcome, while those in Table 11.6 also draw attention to the need to think of development more broadly,

16 Carter et al., 2005a, pp. 476–481; Carter et al., 2006, pp. 51–57; John et al., 2008, pp. 92–99; Kihara et al., 2010.
17 Kihara et al., 2010.
18 Abubakar et al., 2007, pp. 417–430.
19 Bangirana, John et al., 2009, p. 7898; Clarke et al., 2008, pp. 127–138.
20 Worrall et al., 2005, pp. 1047–1059.

beyond cognition and psychomotor development, as well as the value of using multiple sources to gain a more complete picture. A common theme in the literature is the benefit of basic treatment and intervention programmes, with and without antiretroviral (ARV) drugs, in protecting children against cumulative impairment. More recent studies have examined the issue of HIV exposure in a more holistic way, taking into account the potential of both social and biomedical pathways to risk, and examining contributions to resilience. These studies illustrate that the provision of even limited resources can significantly raise the performance level of children, changing the outcome of disease exposure.

In recognition of the acknowledged independent contribution of poverty to poor developmental outcome,[21] most studies used indicators of poverty to ensure matching between groups. However, one study,[22] despite having found that cases and controls differed significantly in social and economic background characteristics, failed to account for this difference in the between groups analysis. The true extent of impairment will, therefore, have been confounded with the effects of poverty.

The lessons learnt from tracking nutritional deficits, prenatal risk and neonatal risk

The more recent studies draw attention to the importance of accounting for intergenerational effects, and for determining the continuities and discontinuities in the influence of different factors, at different time points, through the life cycle. The interaction between physical growth, learning and the later provision of stimulation to the next generation is an important part of the cycle of risk and resilience that should be tracked. As with the literature on infections, these studies also support the need for batteries of measures rather than single-focus outcomes, if the intricacy of development is to be well characterised. This means going beyond measuring individual skills to looking at the application of those skills in real life achievement.

Where there were direct comparisons made between different neighbourhoods, results suggest that the specific context contributes significantly to variability in outcome. To design effective programmes we need to build up much more detailed understanding of factors not only at the household, but also at the broader neighbourhood level that convey a measure of risk or resilience. Three main issues are raised by this literature; one is the need to think about changing influences over the life cycle; the second, differences between different constellations of resources; and thirdly, the best means to capture these influences effectively.

21 Emerson, 2009, pp. 425–426; Richter, 2004, pp. 9–32.

22 Van Rie et al., 2008, pp. 123–128.

Social factors and influences on social development

All four studies of the studies carried out up to 2010 (Timeframe 1) compared the relative contribution of SES in resource constrained settings to that of a variety of other background factors measuring the quality of the environment and health. Only one of the studies was based in an urban setting,[23] but the characteristics and implications of the setting were not the focus of the study. In these settings, a lack of variability in income, parental education level and parental occupation is to be expected and thus the standard indicators of SES developed in richer environments are inappropriate and more locally specific indices were created.

Even though poverty of resources constrain possibilities for all families, children in these environments still experience differences, both at home and at school, in organisation and management that make a differential contribution to risk and resilience.

This suggests that studies need to address more than the resources that are available, and include factors that impact on and reflect the decision-making processes. In only one study was a significant association found between the SES index used and cognitive outcome.[24] Environmental quality (measured by physical features of the classroom and teacher qualities) significantly increased the proportion of variance in cognitive outcome. In the one urban-based study,[25] while neither SES nor maternal education were significantly related with cognitive outcome, home stimulation, measured through the HOME inventory,[26] was. In the remaining two studies, the relationship of SES to cognitive outcome again appeared to be mediated through other contextual factors. In older children this was through the effect on school attendance; and in younger children, through the effect on nutritional status. Even though limited in number, these four studies provide clear precedent for the importance of measuring the quality of the environment and the choices made by parents for their children.

In the studies published after 2010 (Timeframe 2), social development, rather than the social context, became the focus, with particular interest in exploring the causes and consequences of violence and aggression. Evidence was provided of the need to consider the differential susceptibility of sub-groups and of combinations of factors that change the pattern of risk and resilience. There is also increasing evidence of the need to examine pathways of influence that are not merely linear, but that also take into account the interaction between family, child and the context.

23 Bangirana, Giordani et al., 2009, pp. 310–318.
24 Daley et al., 2005, pp. 399–408.
25 Bangirana et al., 2009, pp. 310–318.
26 Bradley, 1989, pp. 191–215; Bradley, 1994.

Conclusions

While there is a growing literature examining the association between the risks experienced by children growing up in resource constrained settings and the sources of resilience that promote the achievement of cognitive and educational potential, publications from studies in sub-Saharan Africa still account for only 1–2 per cent of the output on child development. There are still fewer publications that have investigated the influences on the well-being of children growing up in informal settlements, although the concerns around HIV infection seem to have altered the focus a little towards their needs. Even where the risk factors investigated were found to be associated with a negative effect on the development trajectory, the most marked feature across all studies was the variability in outcomes observed, both within and between study populations. The primary consideration for future studies is, therefore, to take into account differential susceptibility to risk and resilience when identifying efficacious points of intervention.[27]

The application of a 'one-size-fits-all' approach to both the selection of implementation strategies and of monitoring tools has consistently been found to be lacking, such that it is time for contextual validity to be made a key feature of design.[28] Investigators need to ensure, before they begin, that measures used are sufficiently sensitive to pick up variance within a population, while still allowing for meaningful comparisons between populations.

It is more than contextual validity that should concern the research and implementation community, however, as clinical validity is also lacking in the interpretation of most results. While there is a shift from an emphasis on looking for statistical significance alone to considering effect size, more attention needs to be given to understanding, and reporting, what that means in terms of real life potential and achievement.[29] Some studies have used cross-validation between different sources, and others explored in detail the way in which different communities conceptualise problems and success. More needs to be done to make the data collected meaningful and accessible.

The following features are suggested by the literature as being important components of future study designs.

- *Holistic development*: Studies need to address the multiple facets of functioning that may be differentially affected, by addressing more than one domain of development.
- *Interactions*: Given the co-existence of multiple risks, study designs need to investigate possible multiplicative and synergistic effects.

27 Hendricks et al., 2014, pp. 513–531.
28 Ferrett et al., 2014, pp. 395–408; Tan et al., 2014, pp. 271–282.
29 Cromwell et al., 2014, pp. 223–230; Sweetland et al., 2014, pp. 223–232.

- *Context*: Embedding outcomes in their context improves the sensitivity of measurement and identifies significant sources of variability. To avoid misrepresenting the size of any effect, assessment measures used need to be valid, reliable and sensitive to the context in which they are deployed, and development measured against that of relevant comparison groups.
- *Process*: Of primary importance in identifying contributions to risk and resilience are measures of how resources are accessed and deployed.

The experience of growing up in informal settlements in Nairobi, Kenya

To explore issues raised above, we carried out a preliminary study of the association between contextual factors and developmental outcome in a population of school-age children growing up in urban poverty.

Study design and methods

Participants

A large study of psychosocial well-being of orphans and vulnerable children living in two informal (slum) settlements in Nairobi, Kenya, provided data, which included parental and interviewer ratings of children's behaviour and performance.[30] Data were collected between January and June 2007 in two settlements, Viwandani and Korogocho, characterised by temporary and makeshift housing, high poverty levels, poor sanitary conditions, limited educational backgrounds and irregular employment.[31] The population of Viwandani has a higher proportion of men and comprises more recent migrants with a relatively higher education level. Korogocho is characterised by a higher proportion of nuclear families, who have lived in the area longer, but the average per capita income is lower.

All orphans aged between six and 14 years, in both study sites (Viwandani and Korogocho), as well as non-orphans, matched on age and gender, were recruited. The non-orphan children were selected at random from this pool. A greater number of orphans resided in Korogocho, and thus this settlement accounted for a greater proportion of the interviews conducted. A number of children and parents/caregivers could not be reached for reasons including child schooling out of the study area, and children's/caregivers' migration and refusals. This resulted in a total sample of 1 235 children (768 orphans and 467 non-orphans) with information from both the child and the parent/caregiver questionnaires. Finally, 44 records had missing information

30 APHRC & World Bank, 2007.
31 APHRC, 2002.

on the outcomes of interest (as described in the following sub-section), hence a final sample of 1 191 for the purpose of this analysis.

The measurement of variables of interest

Children's performance and behaviour

Questionnaires designed for both children and their parents/guardians, covering multiple aspects of psychosocial well-being, were developed through an iterative process and drew on various source materials, including the Child Status Index and an index of participation in activities of daily living.[32] The tools were designed to be administered by community health workers following a short training period. The main interview tools measured influences on care, security, emotional state and nutrition. Their construction and the results of these interviews are described in detail elsewhere.[33] The core of this analysis was the ratings of achievement/performance and behaviour made by parents/caregivers and the community health workers who interviewed the children. Parents provided 82 per cent of the caregiver responses, with other responses coming from a relative (8 per cent) and a non-relative (10 per cent).

For this analysis, responses were summarised as four dependent variables:

1. *Caregiver's report on child's mood and behaviour rated as*: Excellent, both mood and behaviour rated as excellent; Poor, both the child's mood and behaviour were rated as poor; with any combination resulting in the rating of Acceptable;
2. *Caregiver's report on child's performance*: Poor, Acceptable and Excellent;
3. *Interviewer's observations of child's mood and behaviour*: ratings for Positive Mood, Shy/Withdrawn, Disturbed, Anger/Aggression were combined in a single variable. Scores of 1 for Poor, 2 for Acceptable and 3 for Excellent were summed across the four items, with a total score <8 achieving an overall rating of Poor; 9–10, Acceptable; and a score of 11 or 12 designated Excellent; and finally,
4. *Interviewer's observations of child's performance*: rated as Poor, Acceptable or Excellent.

Child, household and neighbourhood level characteristics

Child-level variables investigated included sex, age and orphanhood status. At the household level, we included a wealth-index, categorisation of the education of the household head and of household size/structure, measured as the number of other

32 O`Donnell et al., 2007.

33 APHRC & World Bank, 2007; Fotso et al., 2009, pp. 130–137; Kimani-Murage et al., 2011, pp. 282–297.

children aged less than 15 years living in the household. The wealth index was constructed from details given by caregivers of household amenities, possessions and assets derived from principal component analysis. A composite index was generated, defined by tertiles and labelled *poorest, middle* and *least poor*. Neighbourhood differences were represented by area of residence. We were also able to compare sources of data collection (interviewer assessments vs parent/guardian).

Analytic strategy

An estimation of the contribution to variability in outcome of multiple potential influences on ordinal dependent variables was carried out using ordinal logistic regressions through the application of STATA's ordered logistic regression (*ologit*) command.[34] Bivariate and multivariate models were carried out. The multivariate models include all covariates described above.

Results

Table 11.11 provides a description of the final sample of 1 191 children included in the analysis, with the reason for exclusions described above. About 38 per cent of the sample children were orphans, 53 per cent females, with 97 per cent attending school. The three age groups of 6–9, 10–12 and 13–14 years comprised approximately equal numbers of children. Given the greater stability of the Korogocho population, making householders easier to trace, meant that this settlement accounted for 75 per cent of respondents. Among household heads, approximately 57 per cent had primary education, with the remainder equally divided between those with no education and those who had attended secondary school.

Descriptive analysis

As reported in Table 11.12, while caregivers rated *Mood/Behaviour* as excellent for nearly 72 per cent of children, interviewers recorded the same rating for only 49 per cent of children. There were also differences between the caregiver's rating and the interviewer's rating with regard to child's *Performance*. Close to 58 per cent of children were rated Excellent by caregivers, compared to only 45 per cent of children with the same rating from the interviewers' perspectives. Goodman and Kruskal's gamma was conducted to determine the association between the four outcome variables. There were very weak, positive correlations for both caregiver–interviewer reports of child *mood/behaviour* (p=0.055), and caregiver–interviewer reports of child *performance* (p=0.051). These respective associations were marginally significant (p<0.05). Moreover, a very weak, positive correlation with statistical significance was demonstrated between caregiver–interviewer reports of child mood/behaviour

34 STATA, 2010.

Table 11.12: Observation of a child's mood, behaviour and performance

	% of endorsement		
Caregiver's rating	**Poor**	**Acceptable**	**Excellent**
1. How happy and content is the child at present? What mood is s/he in, generally?	4.1	18.5	77.4
2. How cooperative is the child? How much does s/he enjoy participating in activities with other children and adults?	1.9	9.8	88.3
3. Performance: How well is the child achieving at home, school or training? Is s/he acquiring knowledge and skills as expected?	6.8	35.4	57.8
4. Mood/behaviour (constructed from items 1 & 2)	5.6	22.5	71.9
Interviewer's observations	**Poor**	**Acceptable**	**Excellent**
1. Positive mood (smiling/laughing/excited)	10.6	65.8	23.6
2. Shy/withdrawn (not making eye contact/looking down/not answering/talking very quietly)	4.3	42.8	52.9
3. Disturbed (crying/picking self/rubbing self)	0.5	22.5	77.0
4. Anger/aggression (rude words/banging table/closed fists)	0.4	6.7	92.9
5. Performance: Showed limited understanding (required extra explanation or answers not related to question)	3.9	51.6	44.5
6. Mood/behaviour (constructed from items 1–4)	9.8	41.0	49.2

Source: Compiled by the authors

and child *performance* (p=0.049; p=0.057). In terms of caregiver reports, there was a statistically significant, weak positive correlation for child *mood/behaviour* and child *performance* (p=0.050), and for interviewer reports, a strong, positive correlation was demonstrated (p=0.034). Accordingly, the associations between caregiver's and interviewer's ratings were very low and barely significant, indicating that they were using different standards for rating the children.

Regression analyses

The coefficients of the bivariate and multivariate results are shown in Table 11.13. Orphaned children displayed significantly poorer mood and behaviour from the caregivers' perspectives in both the bivariate and the multivariate models. A similar association, though weaker, was observed with interviewers' observations of children's mood and behaviour in the bivariate and the multivariate models. There was, however, no association between orphan status and a child's performance. Also, our results indicate that there were no gender differentials in children's performance and mood/behaviour.

Table 11.13 also shows a strong, positive and graded relationship between a child's age and their mood/behaviour and performance, as rated by the interviewers in the bivariate and multivariate models, for both the mood/behaviour and performance. In contrast, not only did the relationship of age with child's mood/behaviour and performance from the caregivers' perspectives not reach statistical significance (even

Table 11.13: Analysis of a child's mood, behaviour and performance

	Caregiver's report				Interviewer's observations			
	Child's mood/behaviour		Child's performance		Child's mood/behaviour		Child's performance	
	Bivariate model	Multivariate model	Bivariate model	Multivariate model	Bivariate model	Multivariate model	Bivariate model	Multivariate model
Orphan status (Ref: Non-orphan)								
Orphan	0.351	−0.307	0.022	−0.007	0.195	−0.199	0.075	0.070
Child sex (Ref: Male)								
Female	0.085	0.076	0.028	−0.017	0.094	−0,032	0.009	0.073
Child age (Ref: 6–9 years)								
10–12	0.224	−0.230	0.070	−0.085	0.529	0.566	1.756	0.835
13–14	0.215	−0.155	0.189	−0.204	0.780	0.860	1.047	1.157
Other children in the household[1] (Ref: 0–1)								
2–3	0.165	−0.130	0.241	−0.206	0.103	−0.003	0.353	−0.275
4+	0.402	−0.314	0.143	−0.055	0.630	−0.484	0.955	−0.864
Education of the household head (Ref: None)								
Primary	0.107	−0.131	0.345	−0.376	0.044	−0.121	0.217	0.126
Secondary +	0.210	0.060	0.022	−0.136	0.161	−0.081	0.239	0.016
Household wealth (Ref: Poorest)								
Middle	0.451	0.391	0.124	−0.170	0.163	0.114	0.155	0.112
Least poor	0.348	0.323	0.039	−0.048	0.089	0.166	0.132	0.276
Area of residence (Ref: Korogocho)								
Viwandani	0.388	0.298	0.424	0.423	1.040	0.978	0.966	0.890

1 Aged less than 15 years

Source: Compiled by the authors

in the bivariate model), the trend was also in the opposite direction, with older children receiving lower ratings.

Children living in households with four or more other children had significantly poorer mood/behaviour, as rated by the interviewers and by the caregivers in both bivariate and multivariate models, and significantly poorer performance as rated by the interviewers in both models. In contrast, the number of other children did not seem to influence a child's performance, as rated by the caregivers.

While there was no clear pattern in the association between the *education of the household head* and the four variables of interest, *household wealth* was significantly and positively linked with a caregiver's rating of a child's mood/behaviour. The results also show a positive, though non-significant, relationship of household wealth with the interviewer's rating of a child's mood/behaviour and performance. The association with the caregiver's report on a child's performance appeared in the opposite direction, but did not reach statistical significance.

Finally, the relationship between *area of residence* (Korogocho or Viwandani) was strong and consistent across the four outcomes and the bivariate and multivariate models, with children from Viwandani displaying better mood/behaviour and performance.

Discussion

Our own investigation further supports the conceptual and methodological issues raised through the literature review, and a number of important themes emerge to guide the development of an evidence base on the major influences experienced in the context of urban poverty.

Our investigation found a significant association between contextual factors and ratings of behaviour and performance, consistent with previous literature. Results suggest that the measure of resources, a wealth indicator, is not as strongly associated with variability in outcome as measures of the quality of the environment. One important theme, therefore, is the importance of *the quality of the context* making a significant contribution to variability in outcome, suggesting the need to monitor not only what resources are available, but also how they are deployed.

At the household level, household size appeared to have a fairly consistent influence on outcome, in the direction that is predicted by other literature on household crowding.[35] The direction of response, with a trend towards poorer households and those with less education rating children's performance more positively, may relate to qualitative differences in the parent–child interaction, leading to different expectations among the raters rather than to actual differences in child performance

35 Bagenda et al., 2006, pp. 729–740; Evans et al., 1998, pp. 1514–1523.

levels. This finding substantiates the need to use multiple sources in evaluating developmental outcomes, an issue that will be revisited below.

Our data also support, in common with other contexts, the need to investigate closely the *neighbourhood characteristics* that make a consistent and significant contribution to outcome.[36] While we might have expected the neighbourhood with more stable family structures to produce higher scores, we consistently found Viwandani to have more positive child outcomes.[37] However, the specific neighbourhood characteristics that contribute to this relative resilience are yet to be adequately understood.

Another theme to emerge from the results is the need to address *multiple influences and multiple outcomes*. The work of Sameroff and Chandler[38] initially suggested that the number of risks experienced was the more important predictor of outcome than the specificity of the risk. However, the observation—both in the literature and from our own results—that different contextual factors impact on different outcomes, and in different ways, supports the need to 'unpack' the contextual factors to identify specific points of intervention.[39] It also supports the need to include a variety of outcome measures in order to describe development adequately. Both of these issues require sample sizes large enough to support the application of multilevel modelling.

Another issue, related to the cultural context, is the need to develop *assessment measures at an appropriate technological level*. The neuropsychological tests used in most of the reviewed studies require a significant time commitment to establish adequate test standardisation, to train staff and assess the children themselves. In addition, the large numbers involved in our current study and the lack of trained personnel to administer cognitive testing procedures found in many similar contexts, made a simpler methodology more appropriate for our investigation. Nonetheless, this methodology proved sensitive to within population differences. There was also support for the separation of our indicators, provided by the difference observed in the pattern of relationships between contextual factors and *mood/behaviour* with that observed with *performance*. Children were not rated according to a response set, as merely positive or negative. Furthermore, that orphan status should be associated with *mood and behaviour* and not *performance* ratings, while education of the household head was associated with *performance* and not *mood/behaviour* ratings, provides further validation of the sensitivity of our outcome indicators.

While there is precedence for the use of simple screening in evaluating development,[40] using ratings provided by lay personnel has, of course, a number of

36 Agarwal & Srivastava, 2009, pp. 68–89; Caughy et al., 2007, pp. 788–798.
37 Fotso et al., 2009, pp. 130–137; Kimani-Murage et al., 2011, pp. 282–297.
38 Sameroff & Chandler, 1975, pp. 57.
39 Sameroff & Rosenblum, 2006, pp. 116–124.
40 Mung'ala-Odera et al., 2006, pp. 683–688.

limitations, including issues concerning variations in interpretation and meaning between those providing the ratings. The observed difference between the ratings of the interviewers and those of the guardians and the very small intercorrelations suggests that the two groups were, perhaps, measuring conceptually different aspects of development and performance. Differences in relation to age, for example, suggest that while the caregivers were sensitive to age-appropriate expectations, the interviewers appear to have measured each child against a single standard, whether they were seven or 14 years of age. In most cognitive performance measures, maturation is normally accounted for by using age-standardised scores, a technique that is probably too sophisticated to use on ordinal ratings. Instead, our results suggest the need for training guidelines to provide benchmarks of age-appropriate standards for people unfamiliar with child assessment. It also supports the value of combining observational measures with information from performance indicators, as well as school or work records.[41]

In common with the majority of studies reported, we also investigated potential risk factors within a cross-sectional design. However, we were able to be more cautious than previous studies not to 'over match' in the establishment of appropriate controls. Our earlier review highlights the limitations of both cross-sectional and closely matched case control studies. The former limits the ability to determine the predictive validity of the measures used. The latter constrains the ability to adequately identify synergistic relationships between contextual factors and specific risks, which might afford appropriate points for intervention. A possible alternative would be to use children as their own controls, and, through a *longitudinal perspective,* measure change over time. A longitudinal perspective would also provide the data necessary to understand the changing relationship between specific risks, contextual features and outcome, across different ages. The lesson to be learnt from the experience of the Head Start early education initiative, for example,[42] is that the observable correlates of early exposures may be many and varied, and can be expected to change over time. In the longer term, it is the 'non-cognitive' skills that are most affected, and provide the most consistent effect over time. These include the emotional regulation, behavioural adjustment, physical and mental health, attention, motivation and self-confidence.[43]

41 Abubakar et al., 2009, pp. 169–178.

42 Raikes & Choen, 2011.

43 Heckman, 2007, pp. 13250–13255; Heckman & Rubinstein, 2001, pp. 145–149; Sameroff & Chandler, 1975, p. 57; Sameroff & Rosenblum, 2006, pp. 116–124; Wober, 1975.

Conclusions

Neighbourhood places a strong influence on the trajectory of development. Neighbourhood structures provide the framework to stimulate or to act against change, and are thus potentially the key to breaking the cycle of poverty and limitations on potential. How we describe the neighbourhood, and how we understand its influence, needs a much more detailed focus than has been the case so far in the literature on child health and development.

While the locally adapted measures of cognition reported in recent literature appear to show construct validity, and to provide evidence of sensitivity to contextual and health effects, evidence of predictive or clinical validity is yet to be provided. The choice of *appropriate measures* is important to establishing sustainable interventions. We need to address aspects of development that are valued by the communities themselves and measurable by instruments sensitive to the definitions and constructs that are meaningful in context.[44] The definition of intelligence, for example, while including some common core concepts, also shows significant differences between cultural groups.[45] The elements of household structure and informal education that contribute to cognitive outcome, while again being present universally, also vary in their structure between social and cultural contexts.[46] With these limitations in mind, there are important invariances in psychological functions across cultures.[47] Thus, while measures from different contexts and cultures can reasonably be used to guide the analysis and interpretation of potential contributions to risk and resilience, a better understanding of their clinical and predictive significance is required to address the priorities and experience of the *specific cultural milieu*.

New directions suggested in measuring child development in the context of urban poverty involve incorporating:

- The analysis of interactions of *multiple influences* within a *longitudinal framework*.
- Measures of both *cognitive and non-cognitive aspects of behaviour and performance* relevant to the specific cultural context.
- Measures of the *quality of the environmental context*, which may be more sensitive than quantitative measures of wealth.
- The use of measures that are *simple and straightforward to administer*, supported by careful training, and *drawing on multiple sources* to provide cross-validation and a greater understanding of clinical meaning.

44 Sternberg et al., 2001, pp. 401–418.
45 Wober, 1975.
46 Holding & Kitsao-Wekulo, 2009, pp. 127–138.
47 Adair, 1999, pp. 403–418; Poortinga, 1999, pp. 419–432.

- Background factors that address *differences at the neighbourhood level*, as these, especially as children get older, appear to exert a more significant effect on choices, behaviours and outcome than differences at the household level.

This framework will likely maximise the validity of the model of risk and resilience that will be developed, as well as the potential efficacy of the resultant intervention studies.

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References

Abdulmalik, J., Ani, C., Ajuwon, A.J. & Omigbodun, O. (2016). Effects of problem-solving interventions on aggressive behaviours among primary school pupils in Ibadan, Nigeria. *Child and Adolescent Psychiatry and Mental Health*, 10(1), 31.

Abessa, T.G., Worku, B.N., Kibebew, M.W., Valy, J., Lemmens, J., Thijs, H., … Granitzer, M. (2016). Adaptation and standardization of a Western tool for assessing child development in non-Western low-income context. *BMC Public Health*, 16, 652.

Abubakar, A., Holding, P., Newton, C.R.J.C., Van Baar, A. & Van De Vijver, F.J.R. (2009). The role of weight for age and disease stage in poor psychomotor outcome of HIV-infected children in Kilifi, Kenya. *Developmental Medicine and Child Neurology*, 51(12), 968–973.

Abubakar, A., Van Baar, A., Van de Vijver, F.J., Holding, P. & Newton, C.R. (2008). Paediatric HIV and neurodevelopment in sub-Saharan Africa: A systematic review. *Tropical Medicine & International Health*, 13(7), 880–887.

Abubakar, A., Van de Vijver, A.J.R., Van Baar, A., Wekulo-Kitsao, P. & Holding, P. (2009). Enhancing psychological assessment in sub-Saharan Africa through participant consultation. In A. Gari & K. Mylonas (eds). *Quod Erat Demonstrandum: From Herodotus' Ethnographic Journeys to Cross-Cultural Research*. International Association for Cross-Cultural Psychology. Athens: Pedio Book Publishing.

Abubakar, A., Van De Vijver, F.J., Mithwani, S., Obiero, E., Lewa, N., Kenga, S., … Holding, P. (2007). Assessing developmental outcomes in children from Kilifi, Kenya, following prophylaxis for seizures in cerebral malaria. *Journal of Health Psychology*, 12(3), 417–430.

Abubakar, A., Van de Vijver, F.J., Van Baar, A., Mbonani, L., Kalu, R., Newton, C. & Holding, P. (2008). Socioeconomic status, anthropometric status, and psychomotor development of Kenyan children from resource-limited settings: A path-analytic study. *Early Human Development*, 84(9), 613–621.

Abuya, B., Onsomu, E., Kimani, J. & Moore, D. (2011). Influence of maternal education on child immunization and stunting in Kenya. *Maternal and Child Health Journal*, 15(8), 1389–1399.

Adair, J.G. (1999). Indigenisation of psychology: The concept and its practical implementation. *Applied Psychology: An International Review*, 48(4), 403–418.

Adnams, C.M., Sorour, P., Kalberg, W.O., Kodituwakku, P., Perold, M.D., Kotze, A., … May, P.A. (2007). Language and literacy outcomes from a pilot intervention study for children with fetal alcohol spectrum disorders in South Africa. *Alcohol*, 41(6), 403–414. *Applied Psychology*, 48(4), 403–418.

Agarwal, S. & Srivastava, A. (2009). Social determinants of children's health in urban areas in India. *Journal of Health Care for the Poor and Underserved*, 20(5), 68–89.

Agarwal, S. & Taneja, S. (2005). All slums are not equal: Child health conditions among the urban poor. *Indian Pediatrics*, 42, 233–244.

Amone-P'Olak, K., Lekhutlile, T.M., Ovuga, E., Abbott, R.A., Meiser-Stedman, R., Stewart, D.G. & Jones, P.B. (2016). Sexual violence and general functioning among formerly abducted girls in Northern Uganda: The mediating roles of stigma and community relations—the WAYS study. *BMC Public Health*, 16, 64.

APHRC. (2002). *Population and Health Dynamics in Nairobi's Informal Settlements. Nairobi*. Kenya: African Population and Health Research Center. Retrieved from: http://aphrc.org/wp-content/uploads/2014/08/NCSS2-FINAL-Report.pdf

APHRC & World Bank. (2007). *The Plight of Orphans and Vulnerable Children in Nairobi Urban Slums in the Face of HIV/AIDS*. Retrieved from: http://aphrc.org/catalog/microdata/index.php/catalog/12/study-description

Bagenda, D., Nassali, A., Kalyesubula, I., Sherman, B., Drotar, D., Boivin, M.J. & Olness, K. (2006). Health, neurologic, and cognitive status of HIV-infected, long-surviving, and antiretroviral-naive Ugandan children. *Pediatrics*, 117(3), 729–740.

Baillieu, N. & Potterton, J. (2008). The extent of delay of language, motor, and cognitive development in HIV-positive infants. *Journal of Neurologic Physical Therapy*, 32(3), 118–121.

Bangirana, P., Giordani, B., John, C.C., Page, C., Opoka, R.O. & Boivin, M.J. (2009). Immediate neuropsychological and behavioral benefits of computerized cognitive rehabilitation in Ugandan pediatric cerebral malaria survivors. *Journal of Developmental and Behavioral Pediatrics*, 30(4), 310–318.

Bangirana, P., John, C.C., Idro, R., Opoka, R.O., Byarugaba, J., Jurek, A.M. & Boivin, M.J. (2009). Socioeconomic predictors of cognition in Ugandan children: Implications for community interventions. *PLOS ONE*, 4(11), 7898.

Barnett. S. & Hustedt J.T. (2005). Head Start's lasting benefits. *Infants and Young Children*, 18(1), 16–24.

Bass, J.K., Nakasujja, N., Familiar-Lopez, I., Sikorskii, A., Murray, S.M., Opoka, R., … Boivin, M.J. (2016). Association of caregiver quality of care with neurocognitive outcomes in HIV-affected children aged 2–5 years in Uganda. *AIDS Care*, 28(1), 76–83.

Bernard-Bonnin, A. (2004). Maternal depression and child development. *Paediatrics and Child Health*, 9(8), 575–583.

Bhargava, A., Jukes, M., Ngorosho, D., Khilma, C. & Bundy, D.A. (2005). Modelling the effects of health status and the educational infrastructure on the cognitive development of Tanzanian schoolchildren. *American Journal of Human Biology*, 17(3), 280–292.

Boivin, M.J., Bangirana, P., Byarugaba, J., Opoka, R.O., Idro, R., Jurek, A.M. & John, C.C. (2007). Cognitive impairment after cerebral malaria in children: A prospective study. *Pediatrics*, 119(2), 360–366.

Boivin, M.J., Sikorskii, A., Familiar-Lopez, I., Ruiseñor-Escudero, H., Muhindo, M., Kapisi, J., … Dorsey, G. (2016). Malaria illness mediated by anaemia lessens cognitive development in younger Ugandan children. *Malaria Journal*, 15, 210.

Bradley, R.H. (1989). The use of the HOME Inventory in longitudinal studies of child development. In M.H. Bornstein & N.A. Krasnegor (eds). *Stability and Continuity in Mental Development: Behavioral and Biological Perspectives*. Hillsdale, NJ: Erlbaum, pp. 191–215.

Bradley, R.H. (1994). The HOME Inventory: Review and reflections. In H. Reese (ed.). *Advances in Child Development and Behavior*. San Diego, CA: Academic Press.

Brahmbhatt, H., Boivin, M., Ssempijja, V., Kigozi, G., Kagaayi, J., Serwadda, D. & Gray, R.H. (2014). Neurodevelopmental benefits of anti-retroviral therapy in Ugandan children 0–6 years of age with HIV. *Journal of Acquired Immune Deficiency Syndromes*, 67(3), 316–322.

Bronfenbrenner, U. & Morris, P.A. (1998). The ecology of developmental processes. In R.M. Lerner (ed.). *Handbook of Child Psychology*, 5th edn, Vol. 1. New York, NY: Wiley, pp. 993–1028.

Carlo, W.A., Goudar, S.S., Pasha, O., Chomba, E., McClure, E.M., Biasini, F.J., … The BRAIN-HIT Committee and the NICHD Global Network for Women's and Children's Health Research. (2012). Neurodevelopmental outcomes in infants requiring resuscitation in developing countries. *The Journal of Pediatrics*, 160(5), 781–785.e1.

Carlo, W.A., Goudar, S.S., Pasha, O., Chomba, E., Wallander, J.L., Biasini, F.J., … the BRAIN-HIT Committee and the NICHD Global Network for Women's and Children's Health Research Investigators. (2013). Randomized trial of early developmental intervention on outcomes in children after birth asphyxia in developing countries. *The Journal of Pediatrics*, 162(4), 705–712.

Carter, J.A., Lees, J.A., Gona, J.K., Murira, G., Rimba, K., Neville, B.G. & Newton, C.R. (2006). Severe falciparum malaria and acquired childhood language disorder. *Developmental Medicine and Child Neurology*, 48(1), 51–57.

Carter, J.A., Mung'ala-Odera, V., Neville, B.G., Murira, G., Mturi, N., Musumba, C. & Newton, C.R. (2005a). Persistent neurocognitive impairments associated with severe falciparum malaria in Kenyan children. *Journal of Neurology and Neurosurgical Psychiatry*, 76(4), 476–481.

Carter, J.A., Ross, A.J., Neville, B.G., Obiero, E., Katana, K., Mung'ala-Odera, V. … Newton, C.R. (2005b). Developmental impairments following severe falciparum malaria in children. *Tropical Medicine and International Health*, 10(1), 3–10.

Caughy, M.O.B., Hayslett-McCall, K.L. & O'Campo, P.J. (2007). No neighborhood is an island: Incorporating distal neighborhood effects into multilevel studies of child developmental competence. *Health & Place*, 13(4), 788–798.

Clarke, S.E., Jukes, M.C., Njagi, J.K., Khasakhala, L., Cundill, B., Otido, J. … Brooker, S. (2008). Effect of intermittent preventive treatment of malaria on health and education in schoolchildren: A cluster-randomised, double-blind, placebo-controlled trial. *The Lancet*, 372(9633), 127–138.

Cromwell, E.A., Dube, Q., Cole, S.R., Chirambo, C., Dow, A.E., Heyderman, R.S. & Van Rie, A. (2014). Validity of US norms for the Bayley Scales of Infant Development-III in Malawian children. *European Journal of Paediatric Neurology*, 18(2), 223–230.

Crookston, B.T., Forste, R., McClellan, C., Georgiadis, A. & Heaton, T.B. (2014). Factors associated with cognitive achievement in late childhood and adolescence: The young lives cohort study of children in Ethiopia, India, Peru, and Vietnam. *BMC Pediatrics,* 14, 253.

Crookston, B.T., Schott, W., Cueto, S., Dearden, K.A., Engle, P., Georgiadis, A., … Behrman, J.R. (2013). Postinfancy growth, schooling, and cognitive achievement: Young lives. *The American Journal of Clinical Nutrition*, 98(6), 1555–1563.

Daley, T.C., Whaley, S.E., Sigman, M.D., Guthrie, D., Neumann, C.G. & Bwibo, N. (2005). Background and classroom correlates of child achievement, cognitive, and behavioural outcomes in rural Kenyan schoolchildren. *International Journal of Behavioral Development*, 29(5), 399–408.

Doyle, O., Harmon, C.P., Heckman, J.J. & Tremblay, R.E. (2009). Investing in early human development: Timing and economic efficiency. *Economics & Human Biology*, 7(1), 1–6.

Elder, J.P., Pequegnat, W., Ahmed, S., Bachman, G., Bullock, M., Carlo, W.A., … Huebner, G. (2014). Caregiver behavior change for child survival and development in low-and middle-income countries: An examination of the evidence. *Journal of Health Communication*, 19(1), 25–66.

Emerson, E. (2009). Relative child poverty, income inequality, wealth, and health. *JAMA: The Journal of the American Medical Association*, 301(4), 425–426.

Engle, P.L., Black, M.M., Behrman, J.R., De Mello, M.C., Gertler, P.J., Kapiriri, L., … Group, I.C.D.S. (2007). Strategies to avoid the loss of developmental potential in more than 200 million children in the developing world. *The Lancet*, 369(9557), 229–242.

Escueta, M., Whetten, K., Ostermann, J. & O'Donnell, K. (2014). Adverse childhood experiences, psychosocial well-being and cognitive development among orphans and abandoned children in five low income countries. *BMC International Health and Human Rights*, 14, 6.

Evans, G.W., Lepore, S.J., Shejwal, B.R. & Palsane, M.N. (1998). Chronic residential crowding and children's well-being: An ecological perspective. *Child Development*, 69(6), 1514–1523.

Ezeamama, A.E., Kizza, F.N., Zalwango, S.K., Nkwata, A.K., Zhang, M., Rivera, M.L., … Whalen, C.C. (2016). Perinatal HIV status and executive function during school-age and adolescence: A comparative study of long-term cognitive capacity among children from a high HIV prevalence setting. *Medicine*, 95(17), 3438.

Ezenwosu, O.U., Emodi, I.J., Ikefuna, A.N., Chukwu, B.F. & Osuorah, C.D. (2013). Determinants of academic performance in children with sickle cell anaemia. *BMC Pediatrics*, 13, 189.

Falkingham, J., Langat, G., Kyobutungi, C. & Ezeh, A. (2011). Does socio-economic inequality in health persist among older people living in resource-poor urban slums? *Journal of Urban Health*, 88(Suppl. 2), 381–400.

Ferguson, K.T., Cassells, R.C., MacAllister, J.W. & Evans, G.W. (2013). The physical environment and child development: An international review. *International Journal of Psychology*, 48(4), 437–468.

Ferrett, H.L., Thomas, K.G.F., Tapert, S.F., Carey, P.D., Conradie, S., Cuzen, N.L., … Fein, G. (2014). The cross-cultural utility of foreign-and locally-derived normative data for three

WHO-endorsed neuropsychological tests for South African adolescents. *Metabolic Brain Disease*, 29(2), 395–408.

Fink, G., Olgiati, A., Hawela, M., Miller, J.M. & Matafwali, B. (2013). Association between early childhood exposure to malaria and children's pre-school development: Evidence from the Zambia early childhood development project. *Malaria Journal*, 12, 12.

Fotso, J.-C. (2007). Urban-rural differentials in child malnutrition: Trends and socioeconomic correlates in sub-Saharan Africa. *Health and Place*, 13(1), 205–223.

Fotso, J.-C., Ezeh, A., Madise, N., Ziraba, A. & Ogollah, R. (2009). What does access to maternal care mean among the urban poor? Factors associated with use of appropriate maternal health services in the slum settlements of Nairobi, Kenya. *Maternal and Child Health Journal*, 13(1), 130–137.

Galler, J.R., Harrison, R.H., Ramsey, F., Forde, V. & Butler, S.C. (2000). Maternal depressive symptoms affect infant cognitive development in Barbados. *The Journal of Child Psychology and Psychiatry and Allied Disciplines*, 41(06), 747–757.

Gashu, D., Stoecker, B.J., Bougma, K., Adish, A., Haki, G.D. & Marquis, G.S. (2015). Stunting, selenium deficiency and anemia are associated with poor cognitive performance in preschool children from rural Ethiopia. *Nutrition Journal*, 15, 38.

Gewa, C.A., Weiss, R.E., Bwibo, N.O., Whaley, S., Sigman, M., Murphy, S.P., … Neumann, C.G. (2009). Dietary micronutrients are associated with higher cognitive function gains among primary school children in rural Kenya. *British Journal of Nutrition*, 101(9), 1378–1387.

Goldberg, R.E. & Short, S.E. (2016). What do we know about children living with HIV-infected or AIDS-ill adults in Sub-Saharan Africa? A systematic review of the literature. *AIDS Care*, 28(2), 130–141.

Gorman, K.S. & Pollitt, E. (1992). Relationship between weight and body proportionality at birth, growth during the first year of life, and cognitive development at 36, 48, and 60 months. *Infant Behavior and Development*, 15(3), 279–296.

Grantham-McGregor, S., Cheung, Y.B., Cueto, S., Glewwe, P., Richter, L., Strupp, B. & Group, I.C.D.S. (2007). Developmental potential in the first 5 years for children in developing countries. *The Lancet*, 369(9555), 60–70.

Grigorenko, E.L., Sternberg, R.J., Jukes, M., Alcock, K., Lambo, J., Ngorosho, D., … Bundy, D.A. (2006). Effects of antiparasitic treatment on dynamically and statically tested cognitive skills over time. *Journal of Applied Developmental Psychology*, 27, 499–526.

Heckman, J.J. (2007). The economics, technology, and neuroscience of human capability formation. *Proceedings of the National Academy of Sciences*, 104(33), 13250–13255.

Heckman, J.J. & Rubinstein, Y. (2001). The importance of noncognitive skills: Lessons from the GED testing program. *The American Economic Review*, 91(2), 145–149.

Hendricks, C., Lansford, J.E., Deater-Deckard, K. & Bornstein, M.H. (2014). Associations between child disabilities and caregiver discipline and violence in low-and middle-income countries. *Child Development*, 85(2), 513–531.

Hensels, I.S., Sherr, L., Skeen, S., Macedo, A., Roberts, K.J. & Tomlinson, M. (2016) Do not forget the boys: Gender differences in children living in high HIV-affected communities in South Africa and Malawi in a longitudinal, community-based study *AIDS Care*. May 26; 28(s2), 100–109.

Holding, P., Anum, A., Van de Vijver, F.J.R., Vokhiwa, M., Bugase, N., Hossen, T., … Bangre, O. (2016). Can we measure cognitive constructs consistently within and across cultures? Evidence from a test battery in Bangladesh, Ghana, and Tanzania. *Applied Neuropsychology: Child*, 1–13.

Holding, P.A. & Kitsao-Wekulo, P.K. (2009). Is assessing participation in daily activities a suitable approach for measuring the impact of disease on child development in African children? *Journal of Child & Adolescent Mental Health*, 21(2), 127–138.

Holding, P.A. & Snow, R.W. (2001). Impact of *Plasmodium falciparum* malaria on performance and learning: Review of the evidence. *American Journal of Tropical Medicine and Hygiene*, 64(1), 68–75.

Horta, B.L., Bas, A., Bhargava, S.K., Fall, C.H.D., Feranil, A., De Kadt, J., … The COHORTS group. (2013). Infant feeding and school attainment in five cohorts from low- and middle-income countries. *PLOS ONE*, 8(8), 71548.

Hürlimann, E., Houngbedji, C.A., N'Dri, P.B., Bänninger, D., Coulibaly, J.T., Yap, P., … Utzinger, J. (2014). Effect of deworming on school-aged children's physical fitness, cognition and clinical parameters in a malaria-helminth co-endemic area of Côte d'Ivoire. *BMC Infectious Diseases*, 14, 411.

Jebena, M.G., Lindstrom, D., Belachew, T., Hadley, C., Lachat, C., Verstraeten, R., … Kolsteren, P. (2016). Food insecurity and common mental disorders among Ethiopian youth: Structural equation modelling. *PLOS ONE*, 11(11), e0165931.

John, C.C., Bangirana, P., Byarugaba, J., Opoka, R.O., Idro, R., Jurek, A.M., … Boivin, M.J. (2008). Cerebral malaria in children is associated with long-term cognitive impairment. *Pediatrics*, 122(1), e92–99.

Jukes, M.C., Pinder, M., Grigorenko, E.L., Smith, H.B., Walraven, G., Bariau, E.M., … Bundy, D.A. (2006). Long-term impact of malaria chemoprophylaxis on cognitive abilities and educational attainment: Follow-up of a controlled trial. *PLOS Clinical Trials*, 1(4), e19.

Kakooza-Mwesige, A., Forssberg, H., Eliasson, A.-C. & Tumwine, J.K. (2015). Cerebral palsy in children in Kampala, Uganda: Clinical sub-types, motor function and co-morbidities. *BMC Research Notes*, 8, 166.

Kariuki, S.M., Abubakar, A., Holding, P.A., Mung'ala-Odera, V., Chengo, E., Kihara, M., … Newton, C.R.J.C. (2012). Behavioral problems in children with epilepsy in rural Kenya. *Epilepsy & Behavior*, 23(1), 41–46.

Kashala, E., Elgen, I., Sommerfelt, K., Tylleskar, T. & Lundervold, A. (2005). Cognition in African children with attention-deficit hyperactivity disorder. *Pediatric Neurology*, 33(5), 357–364.

Kawakatsu, Y., Kaneko, S., Karama, M. & Honda, S. (2012). Prevalence and risk factors of neurological impairment among children aged 6–9 years: From population based cross-sectional study in western Kenya. *BMC Pediatrics*, 12, 186.

Kihara, M., Carter, J.A., Holding, P.A., Vargha-Khadem, F., Scott, R.C., Idro, R. … Newton, C.R. (2009). Impaired everyday memory associated with encephalopathy of severe malaria: The role of seizures and hippocampal damage. *Malararia Journal,* 8, 273.

Kihara, M., De Haan, M., Neville, B., Garrashi, H., Dzombo, J. & Newton, C. (2010). Passive auditory and visual novelty ERPs in children with a history of severe falciparum malaria. *Journal of Neurological Sciences*, 296(88–95).

Kimani-Murage, E.W., Holding, P.A., Fotso, J., Kahurani, E.N., Madise, N.J., Ezeh, A.C. & Zulu, E.M. (2011). Food security and nutritional outcomes among urban poor orphans in Nairobi, Kenya. *Journal of Urban Health*, 88(Suppl. 2), S282–297.

Kitsao-Wekulo, P., Holding, P., Taylor, H.G., Abubakar, A., Kvalsvig, J. & Connolly, K. (2013). Nutrition as an important mediator of the impact of background variables on outcome in middle childhood. *Frontiers in Human Neuroscience*, 7, 713.

Kodituwakku, P.W., Adnams, C.M., Hay, A., Kitching, A.E., Burger, E., Kalberg, W.O. … May, P.A. (2006). Letter and category fluency in children with fetal alcohol syndrome from a community in South Africa. *Journal of Studies on Alcohol and Drugs*, 67(4), 502–509.

Kurstjens, S. & Wolke, D. (2001). Effects of maternal depression on cognitive development of children over the first 7 years of life. *The Journal of Child Psychology and Psychiatry and Allied Disciplines*, 42(5), 623–636.

Kyobutungi, C., Ziraba, A.K., Ezeh, A. & Ye, Y. (2008). The burden of disease profile of residents of Nairobi's slums: Results from a Demographic Surveillance System. *Population Health Metrics*, 6, 1.

May, P.A., Tabachnick, B.G., Gossage, J.P., Kalberg, W.O., Marais, A.-S., Robinson, L.K. & Adnams, C.M. (2013). Maternal factors predicting cognitive and behavioral characteristics of children with fetal alcohol spectrum disorders. *Journal of Developmental and Behavioral Pediatrics*, 34(5), 314–325.

Mireku, M.O., Boivin, M.J., Davidson, L.L., Ouédraogo, S., Koura, G.K., Alao, M.J. & Bodeau-Livinec, F. (2015). Impact of helminth infection during pregnancy on cognitive and motor functions of one-year-old children. *PLOS Neglected Tropical Diseases,* 9(3), e0003463.

Mmari, K., Lantos, H., Blum, R.W., Brahmbhatt, H., Sangowawa, A., Yu, C. & Delany-Moretlwe, S. (2014). A global study on the influence of neighborhood contextual factors on adolescent health. *Journal of Adolescent Health*, 55(6), 13–20.

Molteno, C.D., Jacobson, J.L., Carter, R.C., Dodge, N.C. & Jacobson, S.W. (2014). Infant emotional withdrawal: A precursor of affective and cognitive disturbance in fetal alcohol spectrum disorders. *Alcoholism, Clinical and Experimental Research,* 38(2), 479–488.

Monteiro, N.M., Balogun, S.K. & Oratile, K.N. (2014). Managing stress: The influence of gender, age and emotion regulation on coping among university students in Botswana. *International Journal of Adolescence and Youth*, 19(2), 153–173.

Montgomery, M.R., Stren, R., Cohen, B. & Reed, H.E. (2003). *Cities Transformed: Demographic Change and its Implications for the Developing World*. New York: National Academy of Sciences.

Mung'ala-Odera, V., Meehan, R., Njuguna, P., Mturi, N., Alcock, K.J. & Newton, C. (2006). Prevalence and risk factors of neurological disability and impairment in children living in rural Kenya. *International Journal of Epidemiology*, 35(3), 683–688.

Murray, L., Cooper, P., Arteche, A., Stein, A. & Tomlinson, M. (2016). Randomized controlled trial of the effect of a home visiting intervention on infant cognitive development in peri-urban South Africa. *Developmental Medicine and Child Neurology*, 58(3), 270–276.

Muthuri, S.K., Wachira, L.-J.M., Leblanc, A.G., Francis, C.E., Sampson, M., Onywera, V.O. & Tremblay, M.S. (2014). Temporal trends and correlates of physical activity, sedentary behaviour, and physical fitness among school-aged children in sub-Saharan Africa: A Systematic Review. *International Journal of Environmental Research and Public Health*, 11(3), 3327–3359.

Mutumba, M., Tomlinson, M. & Tsai, A.C. (2014). Psychometric properties of instruments for assessing depression among African youth: A systematic review. *Journal of Child and Adolescent Mental Health*, 26(2), 139–156.

Nabunya, P. & Ssewamala, F.M. (2014). The effects of parental loss on the psychosocial wellbeing of AIDS-orphaned children living in AIDS-impacted communities: Does gender matter? *Children and Youth Services Review*, 43, 131–137.

Neumann, C.G., Murphy, S.P., Gewa, C., Grillenberger, M. & Bwibo, N.O. (2007). Meat supplementation improves growth, cognitive, and behavioral outcomes in Kenyan children. *Journal of Nutrition*, 137(4), 1119–1123.

Niehaus, M.D., Moore, S.R., Patrick, P.D., Derr, L.L., Lorntz, B., Lima, A.A. & Guerrant, R.L. (2002). Early childhood diarrhea is associated with diminished cognitive function 4 to 7 years later in children in a northeast Brazilian shantytown. *American Journal of Tropical Medicine and Hygiene*, 66(5), 590–593.

O`Donnell, K., Nyangara, M., Murphy, R. & Nyberg, B. (2007). *Child Status Index: A Tool for the Monitoring and Evaluation of Orphans and Vulnerable Children Programs*. Retrieved from: pdf.usaid.gov/pdf_docs/Pnadr106.pdf

Patrick, P.D., Orià, R.B., Madhavan, V., Pinkerton, R.C., Lorntz, B., Lima, A.A.M. & Guerrant, R.L. (2005). Limitations in verbal fluency following heavy burdens of early childhood diarrhea in Brazilian shantytown children. *Child Neuropsychology*, 11(3), 233–244.

Poortinga, Y.H. (1999). Different psychologies? *Applied Psychology*, 48(4), 419–432.

Potterton, J., Stewart, A., Cooper, P. & Becker, P. (2010). The effect of a basic home stimulation programme on the development of young children infected with HIV. *Developmental Medicine and Child Neurology*, 52(6), 547–551.

Raikes, H. & Choen, C. (2011). *The Short and Long Term Effects of Head Start*. Retrieved from: https://www.acf.hhs.gov/sites/default/files/opre/short_long_term.pdf

Richter, L. (2004). The impact of HIV/AIDS on the development of children. In R. Pharoah (ed.). *A Generation at Risk? HIV/AIDS, Vulnerable Children and Security in Southern Africa*). Pretoria: Institute for Security Studies, Monograph No. 109, pp. 9–32.

Rochat, T.J., Houle, B., Stein, A., Coovadia, H., Coutsoudis, A., Desmond, C., … Bland, R.M. (2016). Exclusive breastfeeding and cognition, executive function, and behavioural disorders in primary school-aged children in rural South Africa: A cohort analysis. *PLOS Medicine*, 13(6), e1002044.

Ruel, T.D., Boivin, M.J., Boal, H.E., Bangirana, P., Charlebois, E., Havlir, D.V., … Wong, J.K. (2012). Neurocognitive and motor deficits in HIV-infected Ugandan children with high CD4 cell counts. *Clinical Infectious Diseases: An Official Publication of the Infectious Diseases Society of America*, 54(7), 1001–1009.

Sameroff, A. & Chandler, M. (1975). Reproductive risk and the continuum of caretaking casualty. In F. Horowitz, S. Hetherington, S. Scarr-Salapatek & G. Siegel (eds). *Review of Child Development Research*. Chicago, IL: University of Chicago Press, p. 57.

Sameroff, A.J. & Rosenblum, K.L. (2006). Psychosocial constraints on the development of resilience. *Annals of the New York Academy of Sciences*, 1094, 116–124.

Sameroff, A.J., Seifer, R., Barocas, R., Zax, M. & Greenspan, S. (1987). IQ scores of 4-year-old children: Social-environmental risk factors. *Pediatrics*, 79, 343–350.

Santos, D.N., Assis, A.M., Bastos, A.C., Santos, L.M., Santos, C.A., Strina, A., … Barreto, M.L. (2008). Determinants of cognitive function in childhood: A cohort study in a middle income context. *BMC Public Health*, 8, 202.

Sherr, L., Mueller, J. & Varrall, R. (2009). A systematic review of cognitive development and child human immunodeficiency virus infection. *Psychology, Health and Medicine*, 14(4), 387–404.

Skinner, A.T., Oburu, P., Lansford, J.E. & Bacchini, D. (2014). Childrearing violence and child adjustment following exposure to Kenyan post-election violence. *Psychology of Violence*, 4(1), 37–50.

Smith-Greenaway, E. (2015). Are literacy skills associated with young adults' health in Africa? Evidence from Malawi. *Social Science and Medicine*, 127, 124–133.

Soukaloun, D., Kounnavong, S., Pengdy, B., Boupha, B., Durondej, S., Ollness, K., … Nicholas, W. (2003). Dietary and socio-economic factors associated with beriberi in breastfed Lao infants. *Annals of Tropical Paediatrics: International Child Health*, 23, 181–186.

STATA. (2010). STATA Version 11.1 College Station,TX: Stata Corporation.

Sternberg, R.J., Nokes, C., Geissler, P.W., Prince, R., Okatcha, F., Bundy, D.A. & Grigorenko, E.L. (2001). The relationship between academic and practical intelligence: A case study in Kenya. *Intelligence*, 29(5), 401–418.

Stoch, M.B. & Smythe, P.M. (1976). 15-year developmental study on effects of severe undernutrition during infancy on subsequent physical growth and intellectual functioning. *Archives of Disease in Childhood*, 51(5), 327–336.

Sweetland, A.C., Belkin, G.S. & Verdeli, H. (2014). Measuring depression and anxienty in Sub-Saharan Africa. *Depression and Anxiety*, 31(3), 223–232.

Tan, M., Reich, J., Hart, L., Thuma, P.E. & Grigorenko, E.L. (2014). Examining the specific effects of context on adaptive behavior and achievement in a rural African community: Six case studies from rural areas of Southern Province, Zambia. *Journal of Autism and Developmental Disorders*, 44(2), 271–282.

Taylor, H.G., Burant, C.J., Holding, P.A., Klein, N. & Hack, M. (2002). Sources of variability in sequelae of very low birth weight. *Child Neuropsychology*, 8(3), 163–178.

Teklehaimanot, A. & Mejia, P. (2008). Malaria and poverty. *Annals of the New York Academy of Sciences*, 1136(1), 32–37.

Tunde-Ayinmode, M.F. (2015). Children with bronchial asthma assessed for psychosocial problems in a teaching hospital in Nigeria. *African Health Sciences*, 15(2), 690–700.

United Nations, Department of Economic and Social Affairs, Population Division (2014). *World Urbanization Prospects: The 2014 Revision, Highlights* (ST/ESA/SER.A/352). Retrieved from: https://esa.un.org/unpd/wup/publications/files/wup2014-report.pdf

United Nations, Department of Economic and Social Affairs, Population Division (2015) *Population Growth Forecasts*. Retrieved from: http://www.un.org/en/development/desa/news/population/2015-report.html downloaded 18/1/17

Vally, Z., Murray, L., Tomlinson, M. & Cooper, P.J. (2015). The impact of dialogic book-sharing training on infant language and attention: A randomized controlled trial in a deprived South African community. *Journal of Child Psychology and Psychiatry, and Allied Disciplines*, 56(8), 865–873.

Van de Poel, E., O'Donnell, O. & Van Doorslaer, E. (2007). Are urban children really healthier? Evidence from 47 developing countries. *Social Science & Medicine*, 65(10), 1986–2003.

Van Rie A, Dow A, Mupuala A. & Stewart P. (2009). Neurodevelopmental trajectory of HIV-infected 2 preschool-aged children accessing care in Kinshasa, Democratic Republic of Congo. *Journal of Acquired Immune Deficiency Syndrom*e, 52, 636–42.

Van Rie, A., Mupuala, A. & Dow, A. (2008). Impact of the HIV/AIDS epidemic on the neurodevelopment of preschool-aged children in Kinshasa, Democratic Republic of the Congo. *Pediatrics*, 122(1), e123–128.

Walker, S.P., Wachs, T.D., Gardner, J.M., Lozoff, B., Wasserman, G.A., Pollitt, E. & Carter, J.A. (2007). Child development: Risk factors for adverse outcomes in developing countries. *The Lancet*, 369(9556), 145–157.

Wallander, J.L., Bann, C.M., Biasini, F.J., Goudar, S.S., Pasha, O., Chomba, E., … Carlo, W.A. (2014). Development of children at risk for adverse outcomes participating in early intervention in developing countries: A randomized controlled trial. *Journal of Child Psychology and Psychiatry, and Allied Disciplines*, 55(11), 1251–1259.

Wallander, J.L., Biasini, F.J., Thorsten, V., Dhaded, S.M., de Jong, D.M., Chomba, E., … Carlo, W.A. (2014). Dose of early intervention treatment during children's first 36 months of life is associated with developmental outcomes: An observational cohort study in three low/low-middle income countries. *BMC Pediatrics*, 14, 281.

Wanless, S.B., Rosenkoetter, S.E. & McClelland, M. M. (2008). Paternal depression and infant cognitive development: Implications for research and intervention. *Infants and Young Children*, 21(2), 134–141.

Wober, J.M. (1975). *Psychology in Africa*. London: International African Institute.

World Health Organization (WHO). (2007). *Early Child Development: A Powerful Equalizer*. Geneva, Switzerland: WHO Commission on the Social Determinants of Health. Retrieved from: http://www.childhealthandeducation.ca/articles/documents/IrwinSiddiqiHertzman21.pdf

Worrall, E., Basu, S. & Hanson, K. (2005). Is malaria a disease of poverty? A review of the literature. *Tropical Medicine & International Health*, 10(10), 1047–1059.

Yeates, K.O., Taylor, H.G., Walz, N.C., Stancin, T. & Wade, S.L. (2010). The family environment as a moderator of psychosocial outcomes following traumatic brain injury in young children. *Neuropsychology*, 24(3), 345–356.

Zalwango, S.K., Kizza, F.N., Nkwata, A.K., Sekandi, J.N., Kakaire, R., Kiwanuka, N., … Ezeamama, A.E. (2016). Psychosocial adjustment in perinatally human immunodeficiency virus infected or exposed children: A retrospective cohort study. *Journal of the International AIDS Society*, 19(1), 20694.

Chapter 12

Early childhood development interventions: A focus on responsive caregiving

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Introduction

The United Nation's Global Strategy for Women's, Children's and Adolescents' Health (2016–2030) outlines a threefold agenda to ensure that children and adolescents reach their full developmental potential. These include Survive (end preventable deaths), Thrive (ensure health and well-being) and Transform (expand enabling environments). This chapter focuses on the latter two goals. Specifically, and informed by a life-course developmental framework of early childhood and development,[1] we shall discuss an approach to early childhood development intervention that allows children to thrive through transforming and expanding enabling environments as a result of *responsive caregiving*. We focus specifically on one type of environment, namely the care environment provided by community-based organisations (CBOs) and two interrelated child outcomes: cognitive and socio-emotional development. Because thriving is considered an ongoing and unfolding process, it requires an intervention framework that can offer multiple interventions at different time points throughout development, while flexibly adapting to the unique characteristics of each developmental epoch. It also requires an intervention that can be adapted across caregiving contexts and for low-resource settings. Because thriving has multiple dimensions that cut across physical growth, cognitive and socio-emotional learning, and the development of healthy interpersonal relationships, creativity, empathy and the capacity for moral reasoning, it requires an intervention framework that approaches the child as more than the sum of his/her parts.

Against this background, we consider the Mediational Intervention for Sensitizing Caregivers (MISC)[2] to be particularly promising. To set the stage for introducing MISC, we begin this chapter by summarising the effects of adversity on child development,

1 Black et al., 2016.
2 Klein, 1996; 2001.

with special emphasis on the mediating role of sensitive caregiving. Next, we identify and discuss CBOs as a strategic point of early childhood intervention. We then introduce MISC and present data on its effectiveness in low-resource settings, including Uganda and Ethiopia. We conclude by evaluating the promise of MISC within the context of current trends in early childhood development interventions for responsive caregiving.

The effects of adversity on child development

It is estimated that over 270 million children globally fail to reach their full physical, cognitive, psychological and/or socio-emotional potential due to poverty, poor health and nutrition, and insufficient care and stimulation.[3] Children in sub-Saharan Africa and South Asia, home to more than one billion children, are disproportionally affected. Only five out of nine low- and middle-income regions meet criteria for safe drinking water, and HIV/AIDS remains highly concentrated in sub-Saharan Africa. The latter continues to have a grave impact in low- and middle-income countries (LMICs), especially on the lives of children. The number of children under 18 years old orphaned by the AIDS epidemic has continued to increase. Between 2001 and 2012, the global number of children who had lost one or both parents to AIDS-related causes increased from 10 million to 17.8 million, 90 per cent of whom live in sub-Saharan Africa.[4] As of 2012, five countries had one million or more AIDS-affected orphans (Kenya 1.0 million; Nigeria 2.2 million; South Africa 2.5 million; Uganda 1.0 million; the Republic of Tanzania 1.2 million).[5] Thus, despite the progress made in decreasing the incidence and prevalence of HIV, AIDS-related orphanhood continues to be a significant problem for local communities, national governments and international aid organisations.

Other indices of inequity include poor neonatal health and survival, undernutrition and stunting, lack of educational opportunities, open defecation, and child marriage. Currently, more than one-third of three- to four-year-olds in 35 LMICs do not attain basic cognitive and socio-emotional skills such as following directions and inhibiting aggression.[6]

Reports commissioned to evaluate action plans for ameliorating the negative effects of poverty identify responsive and sensitive caregiving, alongside social and mental stimulation, as key targets for achieving the United Nations' Sustainable

3 Black et al., 2016; Grantham-McGregor et al., 2007, pp. 60–70.
4 Joint United Nations Programme on HIV/AIDS (UNAIDS), 2013.
5 UNAIDS, 2013.
6 McCoy et al., 2016.

Development Goals (SDGs).[7] Because caregiving is contextually embedded,[8] sensitive and responsive caregiving can be seen as a key risk factor in the causal chain of poor child outcomes. Conversely, sensitive caregiving is identified as a key protective factor that can buffer against the effects of poverty.

Dealing with the first of these, the assumption is made that adverse circumstances characterised by epidemics (such as HIV/AIDS, poverty, violence, war, undernutrition and the breakdown of extended family structures) disrupt optimal caregiving capacity. Empirical work supports this assumption and shows the effects of poverty and other adversities (such as a chronic illness) on maternal responsiveness to be robust, beginning within the first few months of life and lasting through adolescence.[9] Low-income caregivers face substantial psychosocial and physical stressors as well as reduced social support, which diminish the capacity to be a responsive caregiver. Unresponsive caregiving, in turn, affects the early programming of children's stress responses[10] with negative effects on cognitive outcomes, such as executive functioning,[11] and on socio-emotional outcomes,[12] such as child autonomy.[13]

Poverty and caregiver stress also impacts the quality of the learning environment. Access to cognitively enriching materials varies with socio-economic status, with less access to reading materials and enriching learning activities for children below the poverty line.[14] Animal studies suggest that deprived environments directly affect brain development such as dendritic branching, gliogenesis and synaptic density.[15] Studies of human brain development broadly echo these conclusions. In the United States, it has been shown that children living 1.5 times below the federal poverty level have smaller volumes of several brain regions critical for cognitive and academic performance (grey matter, frontal and temporal lobes, and the hippocampus),[16] consistent with research showing poorer academic and cognitive outcomes for children living in poverty.[17]

The mediating effects of sensitive caregiving in the relationship between poverty and child outcomes demonstrated in Western countries are also demonstrated

7 Grantham-McGregor et al., 2007, pp. 60–70; United Nations (UN), 2015a; 2015b; Walker et al., 2007, pp. 145–157.
8 Belsky & Jaffee, 2006, pp. 38–85.
9 Evans et al., 2008, pp. 232–237.
10 Lawson et al., 2016, pp. 259–278.
11 Blair et al., 2011, pp. 1970–1984.
12 Mistry et al., 2004, pp. 727–745; Sacker et al., 2002, pp. 863–880.
13 Bernier et al., 2010, pp. 326–339.
14 Lawson et al., 2016, pp. 259–278.
15 Sale et al., 2009, pp. 233–239.
16 Hair et al., 2015, pp. 822–829.
17 Black et al., 2016.

in LMICs.[18] Singla et al. (2015) documented an improvement as a result of early childhood intervention in terms of maternal depression.[19] Similar benefits have been observed in previous reports with the MISC caregiver training intervention, which we used in Uganda.[20] Improvements in caregiver mental health relate to improved caregiver functionality. Improved functionality, especially for mothers coping with HIV, can mediate the benefits of improved caregiving on child development, as we have documented in an earlier report with our intervention work with HIV-infected children in Uganda.[21] Therefore, it is important to monitor the mental health benefits of caregiver training interventions as important potential mediators of how such training might enhance the development of at-risk children. However, Singla et al. (2015) noted that for the three systematic reviews they found on the child development benefits of psychosocial stimulation and/or nutrition intervention in LMICs, none targeted mental health outcomes for the caregivers.

While reduced caregiver sensitivity is clearly a risk factor for cognitive and socio-emotional outcomes, the converse is also true. The quality of the learning environment and quality caregiving may perform a buffering function to protect children against the effects of adversity.[22] The buffering effect of quality caregiving may be most strongly observed in the preschool (one to five years of age) developmental period, during which time children develop the dynamic ability to make use of new learning experiences.[23] In support of this notion, and supported by animal literature on maternal buffering of stress hormone effects on hippocampal development, parental nurturance has been shown to affect memory development.[24] Similarly, the quality of parental caregiving at age four years has been shown to predict left hippocampal volume in adolescence, with warmer and more loving nurturance associated with smaller hippocampal volume.[25] The importance of the preschool years is further supported by findings showing that the relationship between quality caregiving and hippocampal volume disappears at eight years of age.[26] The take-home message from these findings is that secure emotional attachments and nurturing environments together create learning experiences that permit the growth of children's neurocognitive development.[27]

18 Aboud & Yousafzai, 2015a, pp. 433–457; Grantham-McGregor et al., 2014, pp. 11–32; Yousafzai & Aboud, 2014, pp. 33–45.
19 Singla et al., 2015, pp. 458–469.
20 Boivin et al., 2013b, pp. 269–278.
21 Bass et al., 2016, pp. 76–83.
22 Bradley & Putnick, 2012, pp. 76–91; Singla et al., 2015, pp. 458–469.
23 Bonnier, 2008, pp. 853–858.
24 Farah et al., 2008, pp. 793–801.
25 Rao et al., 2009.
26 Rao et al., 2009.
27 Feuerstein, 1980; Vygotsky, 1978.

Effective mediation of children's experiences by caregivers, in turn, facilitates children's social-emotional stability and their willingness to explore the world around them.[28] Likewise, Noble et al. (2015) published findings that showed parental education was linearly associated with children's total brain surface area. They documented that any increase in parental education, as small as one extra year of high school or college, was associated with a similar increase in brain cortical surface area over the course of childhood and adolescence.[29]

In summary, the quality of caregiving appears to be a critical mediational pathway by which adverse environments influence both positive and negative cognitive and socio-emotional outcomes in children. Nurturing, caring, enriching and protective interactions provide the context needed for developmental progression to occur and to protect children from the negative effects of stress and adversity.[30] Consistent with this idea, the life course conceptual framework of early childhood development[31] views childhood development as a maturational and interactive process, resulting in an ordered progression of perceptual, motor, cognitive, language, socio-emotional and self-regulation skills. Central to this model is the notion that competence in middle childhood, adolescence and adulthood rely on the foundational capacities established between preconception and early childhood, with multigenerational transmission. While multiple factors influence whether a child reaches competence in various domains, *nurturing care* has been described as the common factor underlying meeting children's needs across the domains of health, nutrition, safety, responsive caregiving and early learning. Nurturing care is defined as 'a stable environment that is sensitive to children's health and nutritional needs, with protection from threats, opportunities for early learning, and interactions that are responsive, emotionally supportive and developmentally stimulating'.[32] Nurturing care is identified as the key ingredient to successful, smart and sustainable early childhood development interventions and is an identified action in the United Nation's Global Strategy for Women's, Children's and Adolescents' Health (2016–2030).

Community-based organisations (CBOs) as a strategic point of intervention for nurturing care

While an obvious environment for nurturing care is the child's home environment, the life course conceptual framework of early childhood development[33] also considers

28 Feuerstein, 1979; 1980.
29 Noble et al., 2015, pp. 773–778.
30 Britto et al., 2016, pp. 91–112.
31 Black et al., 2016.
32 Britto et al., 2016, pp. 91–112.
33 Black et al., 2016.

nurturing care as going beyond the immediate home environment, which should include community caregivers. Here, we suggest a strategic point of intervention to be the CBO environments in which children currently receive community-based care intervention.

Community-based care interventions refer to programmes at the community level, implemented by non-governmental and community-based organisations.[34] CBOs are defined as (often grass-roots) organisations operating as civil society non-profits. They take many forms[35] and provide a wide variety of services, which may include care services to orphaned and vulnerable children or the elderly, support services (including life skills or parenting), social support, counselling services, training, social assistance (such as promoting access to food packages or social grants), community mobilisation, financial assistance and health-care provision.[36] CBOs are highly relevant in low-resource settings with high need, as they provide a low-cost option in resource-limited or expertise-constrained environments.[37] Estimated rates of psychologists and psychiatrists in low-income countries exemplify the scarcity of mental health workers,[38] with four psychologists per 100 000 population in low-resource settings, compared with 26.4 psychologists per 100 000 in the United States[39] and 0.3 psychiatrists per 100 000[40] in South Africa.

The need for community-based responses, specifically for socio-emotional development, was recognised in the mid-1980s[41] due to its cost effectiveness and the benefits of locally based responses.[42] Recent research suggests that community-based mental health can be addressed through community development,[43] an emphasis on human care[44] and task shifting ('task sharing'), defined as 'delegating tasks to existing or new cadres with either less training or narrowly tailored training'—an essential response to shortages in human resources for mental health.[45] Although community-based health care was slow to get off the ground in many sub-Saharan countries, the tide has changed. In South Africa, for instance, there are currently approximately 60 000 community careworkers performing care functions for HIV/AIDS-infected

34 Schenk & Michaelis, 2010, pp. 40–54.
35 Yakubovich et al., 2016, pp, 58–64.
36 Marais et al., 2013, pp. 151–158.
37 Wouters et al., 2012, p. 194.
38 Eaton et al., 2011, pp. 1592–1603; Kakuma et al., 2011, pp. 1654–1663.
39 World Health Organization (WHO), 2002.
40 Lund & Flisher, 2006, pp. 587–594.
41 World Health Organization (WHO), 1984.
42 Braathen et al., 2013, pp. 38–42; Desjarlais et al., 1996.
43 Christens, 2012, pp. 538–554.
44 Jordans & Tola, 2013, pp. 9–10.
45 Kakuma et al., 2011 pp. 1654–1663.

and affected individuals.[46] Indeed, additional reasons for the enthusiasm for the role CBOs may play in addressing the needs of vulnerable children relates to the fact that CBOs are often able to reach the most vulnerable groups.[47] They are typically located in the affected communities and are the frontline access point for the most difficult to reach.[48]

Taken together, CBOs hold enormous potential for bridging the sustainability gap for the reasons described earlier, in addition to their immense scale-up potential. While working directly with individual families and caregivers in the home environment has obvious advantages, empowering CBO caregivers with the skills needed to address the cognitive and socio-emotional needs of vulnerable children may have more significant reach. Therefore, adapting caregiver–child interventions for the CBO environment is expected to transform the way in which unskilled careworkers interact with children affected by adversity, whether as a result of HIV/AIDS, poverty, living with chronically ill parents, crime or violence. Once CBO competence in responsive caregiving is achieved, the scale-up potential lies in CBO careworkers training principal caregivers in the home, who may include grandparents, older siblings, extended family or foster parents. We believe it is here that the largest effects on orphans and vulnerable children will be demonstrated and where sustainability will follow.

Consistent with our own experience,[49] Schenk and Michaelis (2010) have reported that community-based care and support services rely mostly on community members (usually females) serving at the frontline of care. Many such individuals are volunteers, often also struggling with the effects of poverty and HIV.[50] Often depicted as 'just another pair of hands',[51] scholars have emphasised the importance of training to strengthen careworkers' ability to provide adequate services with respect to mental health.[52] The question then arises whether such training and intervention would be acceptable to CBO careworkers. Consistent with other's research,[53] we have found that CBO careworkers themselves expressed an urgent need to be trained in effective ways to respond to the emotional, social and learning needs of the children with whom they work.[54] Given the challenges that caregivers in the child's immediate

46 Schneider et al., 2008, pp. 179–187.
47 Yakubovich et al., 2016, pp. 58–64.
48 Sherr et al., 2016.
49 Marais, 2013, pp. 151–158.
50 Schenk & Michaelis, 2010, pp. 40–54.
51 Walt, 1990.
52 Patel & Kleinman, 2003, pp. 609–615.
53 Schenk & Michaelis, 2010, pp. 40–54.
54 Marais, 2013, pp. 151–158.

home environment face (e.g., high rates of substance use,[55] elderly or chronically ill caregivers, exploitation and maltreatment in some cases),[56] training CBO staff to effectively respond to the needs of HIV-affected and other vulnerable children will have tangible and sustainable quality of life improvements for children and communities.[57]

Despite this promise, there is a general lack of empirical work conducted to evaluate community-based care and support services in low-resource settings.[58] For instance, for HIV-affected children, only 21 care/support intervention studies have been conducted.[59] Compared to HIV prevention and cash transfer interventions, care/support intervention studies are of significantly lower quality, with not a single randomised control trial conducted. Evaluations are predominantly programme-focused internal assessments, with methodologies reflecting a desire to generate immediate and context-specific lessons for programme implementers, providing limited opportunities to generalise beyond the intervention. This is especially true for South Africa,[60] despite the fact that other health and support services in South Africa have been propagated and are an integral part of the South African Mental Health Care Act of 2002. A 2013 WHO report on mental health promotion in LMICs demonstrated at least seven new mental health promotion programmes in South Africa,[61] including Health Wise,[62] Resiliency Programme,[63] Make a Difference,[64] Stepping Stones,[65] CHAMPSA[66] and IMAGE.[67] However, these programmes were often school-based, focused on adolescence (not elementary- or preschool-aged children), and did not specifically focus on CBOs. Furthermore, general monitoring and evaluation has commonly been absent from both the government and the CBO environment.[68] We therefore acknowledge that for the CBO promise to be realised, it is crucial that a solid empirical foundation be built for CBO-based intervention, as is beginning to now emerge in the literature.[69] We also recommend a relationship-

55 Jardin et al., 2016, pp. 1–9.
56 Sharp et al., 2015.
57 Schenk, 2009, pp. 918–942.
58 Kakuma et al., 2011, pp. 1654–1663.
59 Schenk & Michaelis, 2010, pp. 40–54.
60 Freeman & Nkomo, 2006, pp. 503–509; Kuo & Operario, 2010, pp. 344–352.
61 Barry et al., 2013, p. 835.
62 Smith et al., 2008, pp. 311–321.
63 De Villiers & Van den Berg, 2012, 93–102.
64 Mueller et al., 2011, pp. 57–66.
65 Jewkes et al., 2008.
66 Bell et al., 2008, pp. 936–944.
67 Kim et al., 2009, pp. 824–832.
68 Campbell et al., 2008, pp. 159–173.
69 Sherr et al., 2016; Wouters et al., 2012, p. 194; Yakubovich et al., 2016, pp. 58–64.

focused intervention based on the way two or more people connect and interact with one another; due to the evidence base thus far, a relational focus appears to be ideal for the CBO care environment. It is to this that we turn next.

Mediational Intervention for Sensitizing Caregivers (MISC)

MISC is a semi-structured, manualised treatment developed by Klein,[70] which combines mental health with pedagogical principles.[71] MISC trains caregivers on how to maximise emotional and cognitive development specifically in poor communities in Africa, Asia, the United States and Europe.[72] It is an educational approach that aims to enhance the well-being of children and their emotional-social and cognitive development through their daily interactions with the adult/s who care for them. Its long-term objective is enabling parents and caregivers in a process we call **M**ediational **I**ntervention for **S**ensitizing **C**aregivers (MISC). The theoretical foundation of MISC is grounded in Bowlby's attachment theory[73] and Feuerstein's theory of Cognitive Modifiability and Mediated Learning Experience (MLE),[74] which, in turn, draws on Vygotsky's theory of cognitive development.[75] Bowlby suggested that responsive and sensitive caregiving enhances the child's emotion regulation and social-cognitive capacity, which has a profound impact on the child's mental health and cognitive outcomes. Much empirical research over the last 50 years has supported Bowlby's theory for child mental health.[76] Children who receive sensitive and responsive caregiving by parents,[77] teachers and day-care providers[78] show enhanced mental health and cognitive outcomes.

But what does sensitive caregiving look like? Feuerstein and Bowlby's theories suggest that *effective emotional and cognitive learning* take place when learning is *mediated* by an adult who understands the child's needs, interests and capacities, and who takes an active role in shaping components of the environment, as well as components of past and future experiences compatible with the child. The term 'mediation' is from Feuerstein's (1979) approach to the ontogeny of human learning,

70 Klein, 1996; 2001.
71 Shohet & Jaergermann, 2012.
72 Klein, 1996.
73 Bowlby, 1973; 1980.
74 Feuerstein, 1979, pp. 361–371.
75 Vygotsky, 1980.
76 Kim et al., 2013; Sharp, 2006, pp. 101–121; Sharp, 2014; Sharp & Fonagy, 2008, pp. 737–754; Sharp et al., 2006, pp. 197–214; Sharp et al., 2008; Sharp et al., 2011, pp. 563–573; Sharp & Venta, 2012; Sharp et al., 2015, pp. 563–573.
77 Venta et al., 2014, pp. 95–104.
78 Goosen & Van Ijzendoorn, 1990, pp. 832–837; Howes et al., 1998, pp. 25–36; Shohet & Jaegermann, 2012.

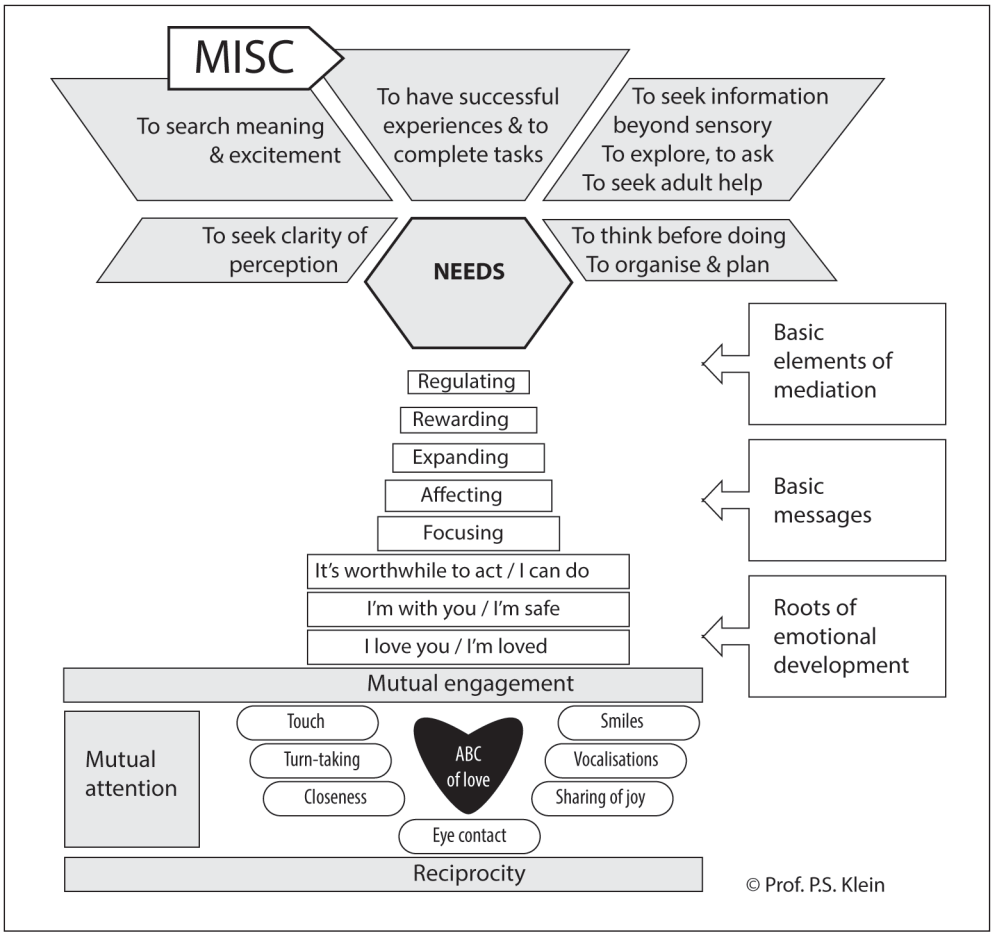


Figure 12.1: The conceptual model guiding the Mediational Intervention for Sensitizing Caregivers (MISC)

Source: Klein & Rosenthal-Sobelman, 2010

where he defines intelligence as the capacity to use previous experiences for future learning.[79] While direct exposure or contact to stimuli may modify or change an individual (that is, cause learning), a particularly potent mechanism for learning is through mediated caregiver/child interaction experiences to enhance cognitive and social development; that is, when an 'expert' serves as an active mediator between a child and the environment, preparing and reinterpreting the stimuli from the environment, so that the exposure becomes cognitively enriching for the child.

79 Feuerstein, 1979, pp. 361–371.

Central to the success of learning is the notion of 'keeping the child's mind in mind' and being sensitive to the child's 'zone of proximal development'—that is, the difference between what a learner can do without help and what they can do with help.[80] Put differently, effective and sustainable cognitive and socio-emotional learning does not occur in a vacuum, but is deeply rooted in the capacity of the adult to treat the child as a psychological agent—that is, someone with a mind who has goals, intentions, beliefs and a history different from that of the adult, with the adult meeting the child at the child's developmental level. Figure 12.1 depicts the conceptual model that explains how MISC enhances caregiver behaviour, which, in turn, enhances emotional and cognitive outcomes in children.

Ingredients of MISC

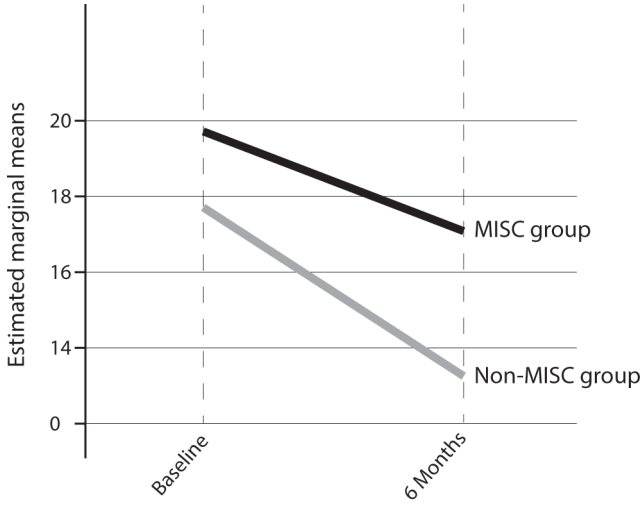
MISC is designed to enhance a caregiver's ability to understand children's behaviour and to provide children with quality interaction through a *matching and synchronising process* between what the caregiver mediates (teaches) and the children's responses. The caregiver reads the child's intensions, needs, cues and preferences, and responds to the child's initiatives. Child responses regulate the amount of stimulation provided by the adult. Thus, adult cultural transmission organises a complex world into an environment in which things have meaning, importance and relevance to future and past experience.[81] In the MISC approach, this is achieved by training caregivers in mediational processes. These include *focusing* (gaining the child's attention and directing them to the learning experience in an engaging manner); *exciting/affecting* (giving meaning to the child's experience, communicating emotional excitement, appreciation and affection with the learning experience); *expanding* (making the child aware of how that learning experience transcends the present situation, therefore extending beyond the immediate need of the moment); *encouraging/rewarding* (emotional support of the child to foster a sense of security and competence, and to identify specific components of the child's behaviour that are considered to contribute to the child's success); and *regulating* (helping to direct and shape the child's behaviour in constructive ways and in relation to specific task requirements with a goal towards self-regulation). By changing these mediational processes, a child's need system is positively affected, enhancing mental health and cognitive outcomes, including the capacity and the need to focus, to seek meaning, to regulate their own behaviour, to plan before doing, to seek success and/or approval, and to inquire about and associate past, present and future experiences.

80 Vygotsky, 1980.
81 Klein & Rye, 2004, pp. 340–354.

While many children will automatically receive mediated learning from parents, caregivers and teachers, there are many for whom external economic and social conditions disrupt caregiving practices in dramatic ways, most notably war, poverty, malnutrition, discrimination and the effects of HIV/AIDS.[82] In these cases, children will often show a lack of learning from new experience, both emotionally and cognitively. Especially in the case of losing primary caregivers (orphanhood), children may experience mental starvation, implying that alongside actual physical deprivation, children may not receive any cultural transmission of mediation from an adult caregiver to feed their mental growth and development.[83] In circumstances of mental starvation, MISC has been shown to be effective in restoring caregiving practices, which, in turn, enhance mental health[84] and cognitive outcomes.[85] In MISC, learning opportunities arise in the course of natural everyday caregiver/child interactions,[86] and, therefore, it is highly suitable for cross-cultural adaptation because it does not depend on the import of Western-based methods, ideas and tools, and operates inside the existing cultural caregiving practices.[87] The MISC process is also very adaptable across developmental periods because it is not highly structured and was developed specifically to adapt flexibly to different contexts; for example, MISC has been used with adults.[88]

However, the MISC process takes time to implement. Consistent with other attachment-based interventions,[89] and our prior experience with MISC,[90] one year is the required length of time because human caregiving behaviour is difficult to change all at once. In contrast to short-term, highly structured interventions that make use of Western-based tools and materials, MISC requires internalisation of basic concepts rather than simply skills-based learning. It is designed to affect the child's need system, to create a new, more differentiated, caregiving context. The time-cost is, however, balanced by the fact that no additional tools or materials are purchased. Moreover, in our experience in Africa, we have found that longer, but smaller dosage, programmes are more compatible culturally. The Western-based model of short-term, intense programme sessions simply is not feasible, and may be considered culturally intrusive. Researchers have found that imposing structured programmes based on other people's cultural standards tends to produce three negative effects:

82 Klein & Rye, 2004, pp. 340–354.
83 Klein & Rye, 2004, pp. 340–354.
84 Tefferra et al., 1996, pp. 95–112.
85 Boivin et al., 2013, pp. 1409–1416.
86 Klein, 1996; 2001; Klein & Rye, 2004, pp. 340–354.
87 Klein et al., 1987, pp. 110–129.
88 Shohet & Jaegermann, 2012.
89 Fonagy, 2006.
90 Boivin et al., 2013, pp. 269–278.



Covariants appearing in the model are evaluated at the following values:
age = 3.9607, sex = 1.4419, SES total = 2.8837

Figure 12.2: Reduction in CBCL internalising symptoms for MISC vs TAU (Non-MISC) groups

Source: Developed by the authors

dependency, alienation and feelings of inferiority in caregivers.[91] Taken together, MISC is ideal for resource-poor environments and is highly scalable because it is not expensive (no materials are used outside of everyday life), it is flexible in terms of adaptation and length, and it makes use of current care structures.

Evidence in support of MISC has been accumulating across low-resource settings. In Uganda, 119 rural uninfected, but HIV-exposed (e.g., orphaned by HIV/AIDS), preschool children and their caregivers were randomly assigned to one of two treatment arms: bi-weekly MISC training, alternating between home and clinic for one year, or a health and nutrition curriculum. MISC resulted in significantly enhanced caregiving quality, irrespective of whether the caregiver was a mother, grandmother or other (aunt, step parent or foster parent).[92]

91 Klein & Rye, 2004, pp. 340–354.
92 Boivin et al., 2013b, pp. 269–278.

In addition, preschoolers with HIV in this study were evaluated with the Achenbach Child Behaviour Checklist (CBCL) for psychiatric symptoms at all time points. Results demonstrated significant decreases in internalising symptoms (improvement) only with MISC training from baseline to six months (see Figure 12.2), although by one-year follow-up, the MISC children remained significantly improved in comparison to the treatment-as-usual (TAU or non-MISC) arm only on CBCL total symptoms.[93]

For mothers dealing with the emotional trauma and stress of HIV, caregiver training can provide an important source of psychosocial support that can enhance the caregiver's emotional well-being and functionality, and thereby her ability to effectively implement the principles of MISC caregiving.[94] The significant gains in terms of caregiver sensitivity and mental health outcomes were complimented by gains in children's cognitive development. Pre-schoolers were evaluated at all time points with the Mullen Early Learning Scales and Color–Object Association Test (COAT) for memory. Results demonstrated that MISC children had significantly greater gains compared to controls on the Mullen Receptive and Expressive Language development scale, and on the Mullen composite score of cognitive ability. COAT total memory for MISC children was marginally better than controls. Caldwell Home Observation for Measurement of the Environment (HOME) scores and observed mediational interaction scores from videotapes measuring caregiving quality also improved significantly more for the MISC group. In all, gains were mediated by improved caregiving.[95]

Further support for MISC comes from a study in Ethiopia where MISC was delivered in an orphanage to careworkers[96] working with pre-schoolers. Consistent with the conceptual model depicted in Figure 12.1, paraprofessional staff demonstrated increased mediational processes, including increased tendency to attend to children's initiations and requests; less frequent use of harsh disciplining behaviours that were regimental; marked reduction in excessive usage of commands, replaced with a more humane approach; increases in understanding that promoting emotional well-being in children, which occurs around everyday activities such as feeding and bathing; in sum, everyday events became opportunities to stimulate emotional growth. In addition, children showed improvement in mental health outcomes, including initiation of interaction; increased levels of activity (children were introverted, fearful

93 Boivin et al., 2013a, pp. 1409–1416.

94 Bass et al., 2016, pp. 76–83; Familiar, Murray et al., 2016, pp. 1–5; Familiar, Nakasujja et al., 2016, pp. 17–24; Murray et al., 2016.

95 Boivin et al., 2013, pp. 269–278.

96 Teferra et al., 1996, pp. 95–112.

and passive prior to the intervention); reduced avoidance behaviours; and increased levels of proximity-seeking behaviour.

Similarly, MISC was used in a rehabilitation day centre where paraprofessional staff were trained in MISC with adults with learning disabilities.[97] Again, MISC demonstrated increased caregiving sensitivity, which, in turn, affected mental health outcomes. In a follow-up study,[98] researchers examined the sustained effects of modifying the mother–infant mediational interaction on infants' cognitive test performance. The study sample comprised 68 families in a small, poor, urban community in Israel assigned to an experimental group and a control group. Paraprofessional trainers carried out the training of mothers in mediation, which was conducted at home. Three years following the intervention, a comparison of the two groups on each of the MISC components revealed significantly more mediation behaviours in the mothers trained in mediation. There were significant differences in favour of the experimental group on the Peabody Picture Vocabulary Test (PPVT), auditory reception and auditory association measures. For the experimental group, the average PPVT IQ was 101 (SD=15.5) and for the control group, 84 (SD=14.1).

The adaptations of MISC to non-home environments highlight its promise for adaptation in the CBO environment. Central to the uniqueness and success of MISC is its method of caregiver training. Following a four-day training in the basic principles of MISC, caregivers learn how to reflect on their caregiving practices through bi-weekly visits by MISC trainers and through the use of video footage. Training is carried out in three basic modes: (1) through individual video guidance (based on the videotaped interactions of the caregiver with a child or a group of four children); (2) through individual in-service training (training the caregiver during her work with the children); and (3) through group training meetings where discussion, elaboration, sharing of issues raised in the individual training sessions, take place. All three training modes are complementary. The process starts with five to six sessions of video guidance on a dyad interaction and, only later on, group videotaped interaction. MISC concepts and language are reflected upon during these sessions. This process is repeated during the year-long intervention, thereby establishing the reflective capacity of the caregiver or careworker in the context of the immediate adult–child interaction. Caregiving practices begin to change slowly as MISC concepts are internalised. Crucially, the caregiver learns skills that are contextually embedded, not only in the particular caregiving setting, but also with a particular child. This allows transference to other situations and matching to each particular child. Therefore, MISC is child-centred and caregivers learn the skills of flexibly responding to the individual cognitive and socio-emotional needs

97 Lifshitz & Klein, 2010, p. 499; Lifshitz et al., 2010, pp. 881–894.
98 Klein, 1996.

of the child by reading the signals of children in here-and-now interactions. As we discuss in the next section, it is this feature of MISC that potentially sets it apart from other early childhood development interventions aimed at targeting responsive and sensitive caregiving.

MISC in the context of early childhood development interventions

A myriad of early childhood development interventions that can be considered nurturing care interventions have been developed and evaluated. A broad range of mechanisms are targeted, including maternal health, maternal nutrition, micronutrients and iodine supplementation, maternal stress, depression and mental disorders, parenting support practices, attachment and bonding, breastfeeding, micronutrients and child feeding, prevention of child maltreatment, out-of-home settings and social protection.[99] Of most relevance to the goals of this chapter are parenting-support interventions, interventions focusing on preventing maltreatment and out-of-home interventions. We therefore focus exclusively on these to contextualise the benefits of MISC, and refer readers to a recent review of interventions targeting other mechanisms beyond sensitive and responsive caregiving.[100]

A systematic review and meta-analysis of 21 interventions aimed at enhancing stimulation and 18 interventions that provided better nutrition,[101] revealed that stimulation had a medium effect size of 0.42 and 0.47 on cognitive and language development, respectively, whereas nutrition by itself had a small effect size of 0.09. Stimulation interventions, which typically occur in the first two years of life, are based on the notion that children need fine motor play activities and materials, along with adult conversation, and have typically been delivered through home visits, group sessions and clinic appointments. These interventions are manualised and the manual of activities may include demonstrations of playing/talking activities to do with the child, followed by having mothers practice and be coached.

A follow-up meta-analytic review by the same group focused not on cognitive developmental outcomes of parenting support programmes but on mental health outcomes.[102] Their findings suggested a standardised mean difference score increase of 0.35 in measures of psychosocial development. Interventions were shown to range from 10–120 hours in duration with no clear association with effect size. Combining group sessions and home visits appeared to be associated with higher effect sizes.

99 Britto et al., 2016, pp. 91–112.
100 Britto et al., 2016, pp. 91–112.
101 Aboud & Yousafzai, 2015, pp. 433–457.
102 Britto et al., 2016, pp. 91–112.

The review further suggested that the use of behaviour-change techniques, including media such as posters and cards that illustrate enrichment practices, opportunities for parental practice of play and responsive talk with their child were particularly effective. UNICEF's Care for Child Development interventions was highlighted as a particularly strong intervention because it uses multiple strategies to strengthen nurturing care in parents. In this intervention, age-appropriate play and communication activities are utilised, which help the young child learn cognitive, motor, social and affective skills. These activities provide a context to enhance the caregiver–child interactions, whereby the caregiver is guided to observe and respond to her child's signals through play. Caregivers try an activity with their child while the health worker observes, coaches and provides feedback to enhance the quality of the interactions. Parents are helped to develop ways of praising and disciplining their children and coached in problem-solving.[103]

A review of parenting interventions to address maltreatment[104] describes components common to interventions, such as individual counselling or group discussion; cognitive-behavioural strategies such as role play; videotape modelling of positive parenting; structured or guided mother–child play, including games and songs; educational communications materials, which model or guide positive behaviours (e.g., illustrations depicting positive childrearing); and use of toys made from readily available objects or materials (e.g., pots, kitchen utensils and scrap fabric). On average, interventions were delivered for a period of three to six months, in five to 15 sessions. The impact of most of these studies is difficult to assess due to methodological differences. However, results from the two largest, highest-quality trials suggest parenting interventions may be feasible and effective in improving parent–child interaction and parental knowledge in relation to child development.[105]

Britto and colleagues' (2016) review of out-of-home interventions found programme quality to be the best predictor of child outcomes. Key ingredients to effectiveness included more and varied play materials, interactive reading, classroom organisation and instructional support. In addition to these structural components, their review also revealed positive interactions, individualised attention and a positive emotional climate as important.[106]

While the above findings speak to the power of parent-support programmes, the noted effect size for cognitive and socio-emotional developmental outcomes is modest in interventions focusing on the prevention of maltreatment and out-of-home interventions that promote nurturing care. We advocate here that a central

103 Yousafzai et al., 2014, pp. 1282–1293.
104 Knerr et al., 2013, pp. 352–363.
105 Knerr et al., 2013 pp. 352–363.
106 Britto et al., 2016, pp. 91–112.

limitation in most of these programmes is a lack of consideration of the child's contribution and perspective in the caregiver–child's relationship, which provides the context for socio-emotional and cognitive learning. Put differently, interventions typically offer skills to caregivers in, for instance, how to play with children (in the case of Care for Child Development), but they do not teach caregivers how to interact with children in a sensitive and responsive way in the here-and-now while taking the mind of the child into account. Most of the MISC training of caregivers is devoted to helping parents become aware and develop practical strategies for focusing, exciting, expanding, encouraging and regulating the child, as learning opportunities arise in the course of natural everyday caregiver/child interactions.[107] MISC is delivered with special attention to the caregivers' objectives for raising their children, and their goals for the ideal child and ideal parent. MISC therefore takes seriously the outcomes caregivers hope to achieve for their children. By adapting the intervention to each specific caregiver–child dyad, MISC raises parental awareness regarding the caregiver's own attitudes about childrearing, their perception of their children and themselves as caregivers (that is, their own mediational profile), their child's emotional and cognitive needs, and awareness of the impact of parental/caregiver interactive behaviour. Because MISC focuses on the relationship between caregiver and child in everyday situations, it does not rely on outside resources or materials, and can be implemented in most populations across various contexts where caregiver/child interactions take place.

Treating the child as a psychological agent in the here-and-now during evolving and dynamic caregiver–child interactions has been shown to be essential to socio-emotional outcomes.[108] In contrast to other interventions, MISC teaches caregivers of children, in whatever context, to slow down in order to consider the perspective of the child. This is the true meaning of responsive caregiving and cannot be achieved by a set of learnt skills that are taught without context and without being child-specific. The video-based approach of MISC, which allows for the operationalisation of the components of sensitive and responsive caregiving as per a theoretically and conceptually grounded model of child attachment and learning provides, in our view, a strong approach that can address both cognitive and socio-developmental needs in low-resource settings.

Conclusion

The aim of this chapter was to discuss early childhood development interventions with a specific focus on targeting nurturing care, as this has been identified as an

107 Klein, 1985; 1996; 2001.

108 Fonagy et al., 2002; Sharp & Fonagy, 2008, pp. 737–754.

essential and neglected feature of early childhood development approaches in the context of sustainable developmental goals. We began by summarising the effects of adversity on child development and showed sensitive caregiving to be an important mediational variable in exacerbating or protecting children against the effects of adversity. Next, we identified and discussed CBOs as a strategic point of early childhood intervention, given its potential for scale-up and reach, the receptiveness of CBO careworkers to education and training, and limitations of children's home environments. We then introduced MISC as an intervention that can be adapted for CBOs, given its demonstrated effectiveness in out-of-home care settings. We concluded by evaluating the promise of MISC in the context of other interventions that focus on promoting sensitive and responsive caregiving. We pointed out the unique features of MISC that enable caregivers to learn to focus on the child's mind during interaction, which stands to complement the skills-based learning of other programmes.

In summary, an estimated 200 million children under five years of age in the LMICs fail to reach their developmental potential. Neuroscientific studies demonstrate that a lack of cognitive stimulation and nurturing care may adversely affect brain development, leading to cognitive delays and limits a child's potential to achieve academic success. Impeding educational outcomes, in turn, lead to a host of other negative outcomes, including lower income potential and, ultimately, the intergenerational transmission of poverty. To break this cycle, it is important to develop and evaluate early childhood intervention programmes that can be scaled up and easily disseminated. In this chapter, we introduced MISC, a programme that trains non-skilled caregivers to be more sensitive to children's developmental needs. MISC has demonstrated significant developmental and long-term cognitive and socio-emotional gains in children from several impoverished communities.[109] Results from our implementation of MISC with HIV caregivers and their children in rural Uganda provide evidence that this intervention is effective in improving a wide range of child neurocognitive, social and behavioural outcomes, with high participation and completion rates. However, further expansion of MISC will necessitate significant financial and human investment. What is needed is the task-shifting of caregiver training models with community caseworkers or peer leaders in a group-based model of community-wide implementation. Such innovation in bringing MISC to scale can be of great benefit in implementing interventions with non-professional lay-providers and conducting hybrid approaches to bundling of services for at-risk caregivers and families. Comparing such approaches to the gold-standard specialist-provider models may shed light on the best way to translate

109 Klein & Rye, 2004, pp. 340–354.

evidence-based programmes into practice, the factors that ensure sustainability and programme fidelity, and the economic implications of programmes. The importance of scale-up potential cannot be overstated, especially in low-resource settings where children face significant adversity with very few highly trained providers to meet their needs.

References

Aboud, F.E. & Yousafzai, A.K. (2015). Global health and development in early childhood. *Annual Review of Psychology*, 66, 433–457.

Barry, M.M., Clarke, A.M., Jenkins, R. & Patel, V. (2013). A systematic review of the effectiveness of mental health promotion interventions for young people in low and middle income countries. *BMC Public Health*, 13, 835.

Bass, J.K., Nakasujja, N., Familiar-Lopez, I., Sikorskii, A., Murray, S. M., Opoka, R., … Boivin, M.J. (2016). Association of caregiver quality of care with neurocognitive outcomes in HIV-affected children aged 2–5 years in Uganda. *AIDS Care*, 28(Suppl. 1), 76–83.

Bell, C.C., Bhana, A., Petersen, I., Mckay, M.M., Gibbons, R., Bannon, W. & Amatya, A. (2008). Building protective factors to offset sexually risky behaviors among black youths: A randomized control trial. *Journal of the National Medical Association*, 100(8), 936–944.

Belsky, J. & Jaffee, S. R. (2006). The multiple determinants of parenting. In D.C. Cichetti & J.D. Cohen (eds). *Developmental Psychopathology: Risk, Disorder and Adaptation*, Vol. 3, pp. 38–85.

Bernier, A., Carlson, S.M. & Whipple, N. (2010). From external regulation to self-regulation: Early parenting precursors of young children's executive functioning. *Child Development*, 81(1), 326–339.

Black, M.M., Walker, S.P., Fernald, L.C., Andersen, C.T., DiGirolamo, A.M., Lu, C., … Grantham-McGregor, S. (2016). Early childhood development coming of age: Science through the life course. *The Lancet*, 389(10064), 77–90.

Blair, C., Granger, D.A., Willoughby, M., Mills-Koonce, R., Cox, M., Greenberg, M.T., … Fortunato, C.K. (2011). Salivary cortisol mediates effects of poverty and parenting on executive functions in early childhood. *Child Development*, 82(6), 1970–1984.

Boivin, M.J., Bangirana, P., Nakasujja, N., Page, C.F., Shohet, C., Givon, D., … Klein, P.S. (2013a). A year-long caregiver training program improves cognition in preschool Ugandan children with human immunodeficiency virus. *Journal of Pediatrics*, 163(5), 1409–1416.

Boivin, M.J., Bangirana, P., Nakasujja, N., Page, C.F., Shohet, C., Givon, D., … Klein, P.S. (2013b). A year-long caregiver training program to improve neurocognition in preschool Ugandan HIV-exposed children. *Journal of Developmental and Behavioral Pediatrics*, 34(4), 269–278.

Bonnier, C. (2008). Evaluation of early stimulation programs for enhancing brain development. *Acta Paediatrica*, 97(7), 853–858.

Bowlby, J. (1973). *Attachment and Loss: Separation*. New York: Basic Books.

Bowlby, J. (1980a). *Attachment and Loss: Loss, Sadness and Depression*. New York: Basic Books.

Bowlby, J. (1980b). *Attachment and Loss: Loss, Sadness and Depression*. Vol. 3. London: Hogarth Press.

Braathen, S.H., Vergunst, R., Mji, G., Mannan, H. & Swartz, L. (2013). Understanding the local context for the application of global mental health: A rural South African experience. *International Health*, 5(1), 38–42.

Bradley, R.H. & Putnick, D.L. (2012). Housing quality and access to material and learning resources within the home environment in developing countries. *Child Development*, 83(1), 76–91.

Britto, P. R., Lye, S. J., Proulx, K., Yousafzai, A. K., Matthews, S. G., Vaivada, T., … Bhutta, Z.A. Early Childhood Development Interventions Review Group, for the Lancet Early Childhood Development Series Steering Committee. (2016). Nurturing care: Promoting early childhood development. *The Lancet*, 389(10064), 91–102.

Campbell, P., Moroni, M. & Webb, D. (2008). A review of monitoring and evaluation in support of orphans and vulnerable children in East and southern Africa. *Vulnerable Children and Youth Studies*, 3(3), 159–173.

Christens, B.D. (2012). Targeting empowerment in community development: A community psychology approach towards enhancing local power and well-being. *Community Development Journal,* 47(4), 538–554.

De Villiers, M. & Van den Berg, H. (2012). The implementation and evaluation of a resiliency programme for children. *South African Journal of Psychology*, 42(1), 93–102.

Desjarlais, R., Eisenberg, L., Good, B. & Kleinman, A. (1996). *World Mental Health: Problems and Priorities in Low-Income Countries*. Oxford: Oxford University Press.

Eaton, J., McCay, L., Semrau, M., Chatterjee, S., Baingana, F., Araya, R., … Saxena, S. (2011). Scale up of services for mental health in low-income and middle-income countries. *The Lancet*, 378(9802), 1592–1603.

Evans, G.W., Boxhill, L. & Pinkaya, M. (2008). Poverty and maternal responsiveness: The role of maternal stress and social resources. *International Journal of Behavioral Development*, 32(3), 232–237.

Familiar, I., Murray, S., Ruisenor-Escudero, H., Sikorskii, A., Nakasujja, N., Boivin, M.J., … Bass, J.K. (2016). Socio-demographic correlates of depression and anxiety among female caregivers living with HIV in rural Uganda. *AIDS Care*, 28(12):1541–1545.

Familiar, I., Nakasujja, N., Bass, J., Sikorskii, A., Murray, S., Ruisenor-Escudero, H., … Boivin, M.J. (2016). Caregivers' depressive symptoms and parent-report of child executive function among young children in Uganda. *Learning and Individual Differences*, 46, 17–24.

Farah, M.J., Betancourt, L., Shera, D.M., Savage, J.H., Giannetta, J.M., Brodsky, N.L., … Hurt, H. (2008). Environmental stimulation, parental nurturance and cognitive development in humans. *Developmental Science*, 11(5), 793–801.

Feuerstein, R. (1979). The ontogeny of learning in man. In M.A.B. Brazier (ed.). *Brain Mechanisms in Memory and Learning*. New York: Raven Press, pp. 361–371.

Feuerstein, R. (1980). *Instrumental Enrichment: Redevelopment of Cognitive Functions of Retarded Performers*. New York: University Park Press.

Feuerstein, R., Rand, Y. & Hoffman, M. (1979). *The Dynamic Assessment of Retarded Performers: The Learning Potential Assessment Device (LPAD)*. Baltimore, MD: University Park Press.

Fonagy, P. (2006). The mentalization-focused approach to social development. In J.G. Allen & P. Fonagy (eds). *Handbook of Mentalization-Based Treatment*. Hoboken, NJ: John Wiley & Sons.

Fonagy, P., Gergely, G., Jurist, E.L. & Target, M. (2002). *Affect Regulation, Mentalization, and the Development of Self*. New York: Other Press.

Freeman, M. & Nkomo, N. (2006). Assistance needed for the integration of orphaned and vulnerable children: Views of South African family and community members. *Journal of Social Aspects of HIV/AIDS Research Alliance*, 3(3), 503–509.

Goosen, F. A., & Van Ijzendoorn, M. (1990). Quality of infant's attachment to professional caregivers: Relation to infant-parent attachment and day-care characteristics. *Child Development*, 61, 832–837.

Grantham-McGregor, S., Cheung, Y.B., Cueto, S., Glewwe, P., Richter, L. & Strupp, B. (2007). Developmental potential in the first 5 years for children in developing countries. *The Lancet*, 369(9555), 60–70.

Grantham-McGregor, S.M., Fernald, L.C., Kagawa, R.M. & Walker, S. (2014). Effects of integrated child development and nutrition interventions on child development and nutritional status. *Annals of the New York Academy of Science*, 1308, 11–32.

Hair, N.L., Hanson, J.L., Wolfe, B. L. & Pollak, S.D. (2015). Association of child poverty, brain development, and academic achievement. *JAMA Pediatrics*, 169(9), 822–829.

Howes, C., Galinsky, E. & Kontos, S. (1998). Child care caregiver sensitivity and attachment. *Social Development*, 7(1), 25–36.

Jardin, C., Marais, L., Bakhshaie, J., Skinner, D., Neighbors, C., Zvolensky, M. & Sharp, C. (2016). Caregiver alcohol use and mental health among children orphaned by HIV/AIDS in South Africa. *Aids Care: Psychological and Socio-Medical Aspects of Aids/HIV*, 1–9.

Jewkes, R., Nduna, M., Levin, J., Jama, N., Dunkle, K., Puren, A. & Duvvury, N. (2008). Impact of stepping stones on incidence of HIV and HSV-2 and sexual behaviour in rural South Africa: Cluster randomised controlled trial. *British Medical Journal*, 337(7666).

Joint United Nations Programme on HIV/AIDS (UNAIDS). (2013). *UNAIDS Report on the Global AIDS Epidemic, 2013*. Retrieved from: http://www.unaids.org/sites/default/files/media_asset/UNAIDS_Global_Report_2013_en_1.pdf

Jordans, M. & Tola, W. (2013). Mental health in humanitarian settings: Shifting focus to care systems. *International Health*, 5, 9–10.

Kakuma, R., Minas, H., van Ginneken, N., Dal Poz, M. R., Desiraju, K., Morris, J. E., … Scheffler, R.M. (2011). Human resources for mental health care: Current situation and strategies for action. *The Lancet*, 378(9803), 1654–1663.

Kim, J., Ferrari, G., Abramsky, T., Watts, C., Hargreaves, J., Morison, L., … Pronyk, P. (2009). Assessing the incremental effects of combining economic and health interventions: The IMAGE study in South Africa. *Bulletin of the World Health Organization*, 87(11), 824–832.

Kim, S., Sharp, C. & Carbonne, C. (2013). The protective role of attachment security for adolescent borderline personality disorder reatures via enhanced positive emotion regulation strategies. *Journal of Personality Disorders: Theory, Research and Treatment*, 5(2), 125–136.

Klein, P. (1985). *More Intelligent and Sensitive Child*. Ramat-Gan, Israel: Bar-Ilan University.

Klein, P. (1996). *Early Intervention: Cross-cultural Experiences with a Mediational Approach*. New York: Garland Press.

Klein, P. (2001). *Seeds of Hope: Twelve Years of Early Intervention in Africa*. Oslo, Norway: Unipub forlag.

Klein, P.S. & Rosenthal-Sobelman, V. (2010). *'Together and Alone': Integration of Children with Special Needs in Regular School Systems* (in Hebrew). Jerusalem: Reches Publications.

Klein, P. & Rye, H. (2004). Interaction-oriented early intervention in Ethiopia: The MISC approach. *Infants and Young Children*, 17(4), 340–354.

Klein, P.S., Wieder, S. & Greenspan, S.I. (1987). A theoretical overview and empirical study of Mediated Learning Experience: Prediction of preschool performance from mother-infant interactions patterns. *Infant Mental Health Journal*, 8(2), 110–129.

Knerr, W., Gardner, F., & Cluver, L. (2013). Improving positive parenting skills and reducing harsh and abusive parenting in low- and middle-income countries: A systematic review. *Prevention Science*, 14(4), 352–363.

Kuo, C. & Operario, D. (2010). Caring for AIDS-orphaned children: An exploratory study of challenges faced by carers in KwaZulu-Natal, South Africa. *Vulnerable Children and Youth Studies*, 5(4), 344–352.

Lawson, G.M., Hook, C.J., Hackman, D. & Farah, M.J. (2016). Socioeconomic status and the development of executive function: Behavioral and neuroscience approaches. In J.A. Griffin, P. McCardle & L.S. Freund (eds). *Executive Function in Preschool-age Children*. Washington, DC: American Psychological Association, pp. 259–278.

Lifshitz, H. & Klein, P.S. (2010). Effects of MISC intervention on cognition, autonomy and behavioural functioning of adults with severe ID. *Journal of Applied Research in Intellectual Disabilities*, 23(5), 489–499.

Lifshitz, H., Klein, P.S. & Cohen, S.F. (2010). Effects of MISC intervention on cognition, autonomy, and behavioral functioning of adult consumers with severe intellectual disability. *Research in Developmental Disabilities*, 31(4), 881–894.

Lund, C. & Flisher, A.J. (2006). Norms for mental health services in South Africa. *Social Psychiatry and Psychiatric Epidemiology*, 41(7), 587–594.

Marais, L., Sharp, C., Pappin, M., Sigenu, K., Skinner, D., Lenka, M., … Serekoane, J. (2013). Community-based support for the mental health of orphans and vulnerable children in South Africa: A triangulation study. *Vulnerable Children and Youth Studies*, 9 (2), 151–158.

McCoy, D.C., Peet, E.D., Ezzati, M., Danaei, G., Black, M.M., Sudfeld, C.R., … Fink, G. (2016). Early childhood developmental status in low- and middle-income countries: National, regional, and global prevalence estimates using predictive modeling. *PLOS Medicine*, 13(6), e1002034.

Mistry, R.S., Biesanz, J.C., Taylor, L.C., Burchinal, M. & Cox, M.J. (2004). Family income and its relation to preschool children's adjustment for families in the NICHD study of early child care. *Developmental Psychology*, 40(5), 727–745.

Mueller, J., Alie, C., Jonas, B., Brown, E. & Sherr, L. (2011). A quasi-experimental evaluation of a community-based art therapy intervention exploring the psychosocial health of children affected by HIV in South Africa. *Tropical Medicine & International Health*, 16(1), 57–66.

Murray, S.M., Familiar, I., Nakasujja, N., Winch, P.J., Gallo, J.J., Opoka, R., … Bass, J.K. (2017). Caregiver mental health and HIV-infected child wellness: Perspectives from Ugandan caregivers. *AIDS Care*, 29(6), 793–799.

Noble, K.G., Houston, S.M., Brito, N.H., Bartsch, H., Kan, E., Kuperman, J.M., … Sowell, E.R. (2015). Family income, parental education and brain structure in children and adolescents. *Nature Neuroscience*, 18(5), 773–778.

Patel, V. & Kleinman, A. (2003). Poverty and common mental disorders in developing countries. *Bulletin of the World Health Organization*, 81, 609–615.

Rao, H., Betancourt, L., Giannetta, J.M., Brodsky, N.L., Korczykowski, M., Avants, B.B., … Farah, M.J. (2009). Early parental care is important for hippocampal maturation: Evidence from brain morphology in humans. *NeuroImage*, 49, 1144–1150.

Sacker, A., Schoon, I. & Bartley, M. (2002). Social inequality in educational achievement and psychosocial adjustment throughout childhood: Magnitude and mechanisms. *Social Science and Medicine*, 55(5), 863–880.

Sale, A., Berardi, N. & Maffei, L. (2009). Enrich the environment to empower the brain. *Trends in Neurosciences*, 32(4), 233–239.

Schenk, K.D. (2009). Community-based interventions providing care and support to orphans and vulnerable children: A review of evaluation evidence. *AIDS Care*, 21, 918–942.

Schenk, K. & Michaelis, A. (2010). Community intervnetions supporting children affected by HIV in sub-Saharan Africa: A review to derive evidence-based principles for programming. *Vulnerable Children and Youth Studies*, 5(1), 40–54.

Schneider, H., Hlope, H. & Van Rensburg, D. (2008). Community health workers and the response to HIV/AIDS in South Africa: Tensions and prospects. *Health Policy and Planning*, 23(3), 179–187.

Sharp, C. (2006). Mentalizing problems in childhood disorders. In J.G. Allen & P. Fonagy (eds). *Handbook of Mentalization-based Treatments*. Hoboken, NJ: John Wiley & Sons, pp. 101–121.

Sharp, C. (2014). The social-cognitive basis of borderline personality disorder: A theory of hypermentalizing. In C. Sharp & J. Tackett (eds). *The Handbook of Borderline Personality Disorder in Children and Adolescents*. New York: Springer.

Sharp, C. & Fonagy, P. (2008a). The parent's capacity to treat the child as a psychological agent: Constructs, measures and implications for developmental psychopathology. *Social Development*, 17(3), 737–754.

Sharp, C. & Fonagy, P. (2008b). Social cognition and attachment-related disorders. In C. Sharp, P. Fonagy & I.M. Goodyer (eds). *Social Cognition and Developmental Psychopathology*. Oxford: Oxford University Press.

Sharp, C., Fonagy, P. & Goodyer, I.M. (2006). Imagining your child's mind: Psychosocial adjustment and mothers' ability to predict their children's attributional response styles. *British Journal of Developmental Psychology*, 24, 197–214.

Sharp, C., Fonagy, P. & Goodyer, I.M. (2008). *Social Cognition and Developmental Psychopathology*. Oxford: Oxford University Press.

Sharp, C., Jardin, C., Marais, L. & Boivin, M. (2015). Orphanhood by AIDS-related causes and child mental health: A developmental psychopathology approach. *Journal of HIV/AIDS*, 1(3), 10.

Sharp, C., Pane, H., Ha, C., Venta, A., Patel, A.B., Sturek, J. & Fonagy, P. (2011). Theory of mind and emotion regulation difficulties in adolescents with borderline traits. *Journal of the American Academy of Child and Adolescent Psychiatry*, 50(6), 563–573.

Sharp, C. & Venta, A. (2012). Mentalizing problems in children and adolescents. In N. Midgley & I. Vrouva (eds). *Minding the Child: Mentalization-based Interventions with Children, Young People and their Families*. London: Routledge.

Sharp, C., Venta, A., Ha, C., Schramm, A., Reddy, R. & Newlin, E. (2015). First empirical evaluation of the link between attachment, social cognition and borderline features in adolescents. *Comprehensive Psychiatry*, 64, 4–11.

Sherr, L., Yakubovich, A.R., Skeen, S., Cluver, L.D., Hensels, I.S., Macedo, A. & Tomlinson, M. (2016). How effective is help on the doorstep? A longitudinal evaluation of community-based organisation support. *PLOS ONE*, 11(3).

Shohet, C. & Jaegermann, N. (2012). Integrating infant mental health into primary health care and early childhood education settings in Israel. *Zero to Three*, 33(2), 55–58.

Singla, D.R., Kumbakumba, E. & Aboud, F.E. (2015). Effects of a parenting intervention to address maternal psychological wellbeing and child development and growth in rural Uganda: A community-based, cluster randomised trial. *Lancet Global Health*, 3(8), e458–469.

Smith, E., Palen, L.A., Caldwell, L., Flisher, A., Graham, J., Mathews, C., … Vergnani, T. (2008). Substance use and sexual risk prevention in Cape Town, South Africa: An evaluation of the HealthWise Program. *Prevention Science*, 9(4), 311–321.

Teferra, T., Wolde, L., Zewde, T., Melese, F., Fekadu, Z., Rye, H. & Hundeide, K. (1996). Mediational intervention for sensitizing caregivers: Ethopia. In P.S. Klein (ed.). *Early Intervention: Cross-cultural Experiencs with a Mediational Approach*. New York: Garland, pp. 95–112.

United Nations (UN). (2015a). *Every Woman Every Child. The Global Strategy for Women's, Children's and Adolescents' Health (2016–2030)*. Retrieved from: http://www.who.int/pmnch/media/events/2015/gs_2016_30.pdf

United Nations (UN). (2015b). *Transforming our World: The 2030 Agenda for Sustainable Development, 2015*. Retrieved from: http://www.un.org/ga/search/view_doc.asp?symbol=A/RES/70/1&Lang=E

Venta, A., Sharp, C. & Newlin, E. (2014). A descriptive study of symptom change as a function of attachment and emotion regulation in a naturalistic adolescent inpatient setting. *European Child and Adolescent Psychiatry*, 24(1), 95–104.

Vygotsky, L.S. (1978). *Mind in Society: The Development of Higher Psychological Processes*. Cambridge, MA: Harvard University Press.

Vygotsky, L.S. (1980). *Mind in Society*. Boston: Harvard University Press.

Walker, S.P., Wachs, T.D., Gardner, J.M., Lozoff, B., Wasserman, G.A., Pollitt, E., … Carter, J.A. (2007). Child development: Risk factors for adverse outcomes in developing countries. *The Lancet*, 369(9556), 145–157.

Walt, G. (1990). *Community Health Workers in National Programmes: Just Another Pair of Hands*. Philadelphia, PA: Open University Press.

World Health Organization (WHO). (1984). Mental Health Care in Developing Countries. Technical Report Series 698. Geneva: World Health Organization. Retrieved from:

http://apps.who.int/iris/bitstream/10665/41399/1/WHO_TRS_646.pdf

World Health Organization (WHO). (2002). *Atlas: Mapping Mental Health Resources in the World*. Retrieved from: http://www.fozp.org.pl/pdf/1_3/01_pgp_1_3_artykul_de_mendonca_lima.pdf

Wouters, E., Van Damme, W., Van Rensburg, D., Masquillier, C. & Meulemans, H. (2012). Impact of community-based support services on antiretroviral treatment programme delivery and outcomes in resource-limited countries: A synthetic review. *BMC Health Services Research*, 12, 194.

Yakubovich, A.R., Sherr, L., Cluver, L.D., Skeen, S., Hensels, I.S., Macedo, A. & Tomlinson, M. (2016). Community-based organizations for vulnerable children in South Africa: Reach, psychosocial correlates, and potential mechanisms. *Children and Youth Services Review*, 62, 58–64.

Yousafzai, A.K. & Aboud, F. (2014). Review of implementation processes for integrated nutrition and psychosocial stimulation interventions. *Annals of the New York Academy of Science*, 1308, 33–45.

Yousafzai, A.K., Rasheed, M.A., Rizvi, A., Armstrong, R. & Bhutta, Z.A. (2014). Effect of integrated responsive stimulation and nutrition interventions in the Lady Health Worker Programme in Pakistan on child development, growth, and health outcomes: A cluster-randomised factorial effectiveness trial. *The Lancet*, 384(9950), 1282–1293.

Chapter 13

Resilience in children and adolescents

Sharain Suliman, Leigh van den Heuvel & Soraya Seedat

Resilience in childhood

Many African children and adolescents grow up in significant adversity. Besides the effects of war and conflict-related trauma, community violence exposure, domestic violence and sexual victimisation are relatively pervasive adversities.[1] Additionally, many African children and adolescents are exposed to wide-ranging challenges associated with HIV and socio-economic disadvantage.[2] Negative experiences such as these have been linked to the development of an array of psychological, physical and behavioural problems, with accumulation of these risks potentially exacerbating negative outcomes.[3] Despite this, many youth are able to sustain normal growth trajectories. This has led to much interest in understanding vulnerability and risk, and protective factors and their convergence on the concept of resilience.[4] Vulnerability refers to the susceptibility to negative influences that increases the risk of negative outcomes, including psychiatric and medical disease, and may be primary (already present at birth, such as genetic factors, preterm birth and birth complications) or secondary (due to exposure during life, such as disease and poor cognitive abilities). Risk factors (e.g., poverty, parental alcohol and drug abuse) are attributes that increase the probability of disease and disorder, while protective factors are individual/family/community-level characteristics (e.g., cognitive competencies, secure attachment to a caregiver and social support from outside the family) that mitigate the negative effects of stressful life events.[5]

Definitions of resilience

Resilience represents a dynamic transactional process between risk and protective factors in the child or adolescent and their environment.[6] The concept of resilience

1 Seedat et al., 2009, pp. 1011–1022; World Health Organization (WHO), 2002.
2 Cortina et al., 2013; Cluver et al., 2015. pp. 57–65.
3 Sherr et al., 2014, pp. 251–259.
4 Masten et al., 2004, pp. 1071–1094; Werner, 1994.
5 Skala & Bruckner, 2014, pp. 208–217.
6 Rutter, 2000, pp. 651–682.

draws on attachment theory principles—as developed by John Bowlby and Mary Ainsworth—of a child's ties to their mother (attachment figure) as a secure base from which to explore the world, and disruption of these ties through separation, deprivation and bereavement, which lead to negative developmental and psychological sequelae.[7] Psychological resilience, as we understand it today, is a fluid and multidimensional bio-psycho-social construct that refers to individual ability and adaptation in the context of adverse circumstances. It may have developmental origins and can vary with time, context, gender, cultural origin and individual life circumstances.[8] A variety of definitions of resilience have been proposed:

- Rutter (1987): 'The positive end of the distribution of developmental outcomes among individuals at high risk.'
- Luthar et al. (2000): 'Resilience refers to a dynamic process encompassing positive adaptation within the context of significant adversity.'
- Connor (2006): 'Resilience can be defined as a measure of stress coping ability.'
- Cortina et al. (2016): 'We define resilience as the absence of psychological problems as well as the presence of positive social skills despite exposure to chronic adversity …'
- Masten (2001): 'Resilience refers to a class of phenomena characterized by good outcomes in spite of serious threats to adaptation or development.'
- Ungar (2011): 'Resilience is predicted by both the capacity of individuals, and the capacity of their social and physical ecologies to facilitate their coping in culturally meaningful ways.'

Collishaw et al. (2016) note that most definitions include the idea that resilience encompasses human capacity to adapt better than expected, socially, mentally and physically after exposure to risk.[9] These definitions imply that for a child/adolescent to be considered resilient, two things need to occur. First, they should have experienced some form of risk or threat that may have a negative effect on the normal developmental trajectory, resulting in a greater likelihood of manifesting problematic outcomes. Second, the quality of adaptation or developmental outcomes due to this threat/adversity must be assessed to be positive. Masten and O'Dougherty (2009) note that this suggests a capacity to regain equilibrium quickly, to return to an initial state of health, and, possibly, to grow and strengthen as a result of the experience. Resilience, therefore, is not simply the absence of negative outcomes.[10]

7 Bretherton, 1992, p. 759.
8 Ahern, 2006, pp. 175–185; Connor, 2006, pp. 46–49; Masten, 2007, pp. 921–930.
9 Collishaw et al., 2016, pp. 719–730.
10 Masten & O'Dougherty, 2009, p. 213.

Profile of resilience

In youth, attributes of resilience, or qualities that enable one to thrive when confronted with adversity,[11] are purported to include personal characteristics of the individual (e.g., genetic, biological, personality and temperament factors), family/social support characteristics (e.g., relationships with family and friends) and characteristics of the community (e.g., schools and security resources).[12] Paradoxically, these are the very same factors that can put a child at risk of adversity/violence.[13]

The vast majority of research on resilience has been undertaken in youth in Western countries, raising concern about the generalisability of models of resilience, and of aspects that need improvement to better fit other cultures and societies. Further research is needed to explore this question.[14] Even so, research conducted in African children and adolescents seems to suggest that these domains are relevant. For example, one study conducted across 11 countries, including three in Africa (Gambia, Tanzania and South Africa), identified seven cross-cultural factors related to positive youth development: access to material resources, relationships, identity, cohesion, power and control, social justice and cultural adherence.[15] In addition, a review on risk and protective factors for physical and sexual abuse in children and adolescents in Africa identified a range of correlates of abuse.[16] These included *community-level factors* (exposure to bullying, sexual violence and rural/urban location), *household-level factors* (poverty, household violence and non-nuclear family), *caregiver-level factors* (caregiver illness—in particular AIDS and mental health problems, caregiver changes, family functioning, parenting, caregiver–child relationship and substance abuse), and *child-level factors* (age, disability, physical health, behaviour and gender).

In Africa, resilience in the context of adversity poses unique challenges. In an overview of the impact of adult HIV on children, numerous protective factors were identified.[17] These included characteristics of the infected caregiver and affected child (e.g., age, sex and personal adaptability),[18] the level of social support, the economic status of the family, the availability of relevant services and the level of stigma experienced.

In a qualitative study that aimed to identify resources of family resilience after child sexual abuse, data were collected from nine parents living in the Western

11 Connor, 2006, pp. 46–49.
12 Agnafors et al., 2016, pp. 584–596; Ahern, 2006, pp. 175–185; Olsson et al., 2003, pp. 1–11.
13 WHO, 2002.
14 Masten & O'Dougherty, 2009, p. 213.
15 Ungar et al., 2008, pp. 63–64.
16 Kidman & Palermo, 2016, pp. 172–180.
17 Sherr et al., 2014, pp. 251–259.
18 Luthar, 2003.

Cape province, South Africa. Results indicated that the families, despite adverse situations, utilised both internal and external resilience resources. With regard to the children, these internal resources included their ability to cope with the abuse, boundaries in the family and sibling relationships. External family resources included the support of extended family members, friends and a local community-based, non-profit organisation working with child sexual abuse and schools.[19] Additionally, a study conducted by Shehu and Mokgwathi (2008) in Botswana, with a sample of 1 700 adolescents, found that female adolescents were more resilient than male adolescents, which was positively correlated to an internal locus of control.[20]

Resilience and self-efficacy were assessed in a sample of 1 060 Kenyan orphans and vulnerable children, who were taking part in a community-based programme combining economic household strengthening with psychosocial support. The authors found an association between resilience and self-efficacy.[21] Black South Africans (n=213; age range 14–16 years) from Mamelodi (east of Pretoria), in the Gauteng province of South Africa, were included in a study aiming to validate a measure of resilience in low-resource South African neighbourhoods. Four factors defined resilience in the setting: (1) confidence and internal locus of control; (2) social support; (3) toughness and commitment; and (4) achievement orientation.

Resilience and psychopathology

In a study of South African youth in the Western Cape, South Africa, resilience was negatively correlated with perceptions of stress, symptoms of post-traumatic stress disorder (PTSD) and depression, exposure to community violence and emotional abuse/neglect, physical abuse/neglect and sexual abuse during childhood, and was positively correlated with perceptions of social support from family, friends and significant others.[22] In considering resilience and psychopathology in the setting of sexual violence, Van der Walt et al. (2014) found increased vulnerability to PTSD early after a rape in adolescents compared to adults, with this association mediated by previous life traumas.[23]

Another study of children and adolescents living in urban settlements around Cape Town, South Africa, found mental health resilience to be associated with multiple, and cumulative, processes across child, family and community-levels of influence. Child physical health, greater optimism, better caregiving quality, food

19 Vermeulen & Greeff, 2015, pp. 555–571.
20 Shehu & Mokgwathi, 2008, pp. 95–105.
21 Goodman et al., 2016, pp. 2229–2246.
22 Bruwer et al., 2008, pp. 195–201.
23 Van der Walt et al., 2014, pp. 239–249.

security, better peer-relationship quality, and lower exposure to community violence, bullying or stigma at baseline predicted sustained resilience.[24]

Coping

Conceptualisations of resilience in youth have, to a large extent, focused on coping resources. Coping has been described by Lazarus (1993) as an 'effortful response to stress that intends to reduce the discrepancy between environmental demands and personal resources'.[25] Coping, self-esteem and hope for the future have all been identified as key individual factors for child resilience.[26] Results of a study of 1 228 children from the Mpumalanga province in South Africa suggest that those with more positive cognitive interpretations had better psychological functioning on scales of depression, anxiety, somatisation and sequelae of potentially traumatic events, while children with more negative cognitions viewed the school environment more negatively.[27]

Jorgensen and Seedat (2008) used the Connor-Davidson Resilience Scale (CD-RISC) to measure stress coping ability in a sample of South African adolescents. Age and ethnicity were the only demographic factors significantly correlated with resilience scores.[28] In a sample of 787 adolescents from Cape Town, South Africa, Fincham et al. (2009) investigated whether resilience moderated the relationship between childhood abuse and symptoms of PTSD, and found that the independent effect of childhood abuse and neglect on PTSD symptoms was significantly reduced with increasing resilience. Resilience did not, however, interact with exposure to community violence or to perceived levels of stress to influence PTSD symptoms.[29]

Factors that influence the mental health of school-going adolescents residing in low-income communities in the Western Cape were studied by Harrison (2014). Results indicate that factors such as problem-solving coping, stronger perceived social support and resilience may buffer the impact of perceived contextual stressors on adolescents, while other factors, such as avoidant coping, may increase adolescents' vulnerability.[30] Positive thoughts about the future, despite low life satisfaction, were found to motivate Nigerian youths to develop a variety of coping skills.[31] In a study of 284 randomly selected undergraduates from a University in Nigeria (44.7 per

24 Collishaw et al., 2016, pp. 719–730.
25 Lazarus, 1993, pp. 234–247.
26 Betancourt, Meyers-Ohki et al., 2013, pp. 423–444.
27 Cortina et al., 2013.
28 Jorgensen & Seedat, 2008, pp. 23–32.
29 Fincham et al., 2009, pp. 193–199.
30 Harrison, 2014.
31 Oladipo & Idemudia, 2015, pp. 57–65.

cent between the ages of 16 and 20 years), Oladipo and Idemudia (2015) identified personality characteristics of meaningfulness, perseverance and self-reliance as contributing to resilience.[32]

Protective factors (e.g. social support)

Greater cognitive social capital (i.e., perceptions of trust and reciprocity within communities) has been found to be protective against common mental disorders.[33] In fact, the availability of positive adult social support is one of the most important environmental factors in promoting resilience in maltreated children, with social support ameliorating the risk for depression associated with maltreatment, particularly in those children who are at a heightened genetic risk for depression.[34]

Social support and family factors have also been found to reduce the negative effects of violence exposure on South African youth. Data from 424 Zulu adolescents attending two high schools in townships near Durban, South Africa, showed that positive adult involvement (i.e., healthy and prosocial relationships) was a protective factor of resilience by moderating the effects of violent behaviour among South African youth.[35] Other South African studies have found that parenting styles and emotionally supportive friendships influence resiliency among adolescents.[36]

A longitudinal study of the role of cognitive social capital in 176 war-affected children from the north-western province of Cibitoke in Burundi found a protective effect of cognitive social capital on depressive symptoms and functional impairment, as well as a promotive effect for increasing social support.[37]

Vindevogel et al. (2014) explored resources that helped former child soldiers to deal with war-related adversity and subsequent challenges: 1 008 youth (330 of whom had previously been child soldiers) from the Lira district of northern Uganda most commonly identified religious beliefs, social support and mental health resources as elements fostering their resilience. The authors noted that these fell within the three core domains of the conceptual framework of the Psychosocial Working Group: cultural, social and human capital.[38]

In a recent systematic review of factors associated with post-conflict psychosocial adjustment and social integration of former child soldiers, family acceptance, social support, and educational and economic opportunities were identified as resources

32 Oladipo & Idemudia, 2015, pp. 57–65.
33 De Silva et al., 2005, pp. 619–627.
34 Kaufman et al., 2006, pp. 673–680; Kaufman et al., 2004, pp. 17316–17321.
35 Choe et al., 2012, pp. 166–181.
36 Hoffman, 2010, pp. 385–394; Mathibe, 2015; Steyn, 2009.
37 Hall et al., 2014, pp. 285.
38 Vindevogel et al., 2014, pp. 134–140.

associated with improved psychosocial adjustment. On the other hand, abduction, age of conscription, exposure to violence, gender and community stigma were associated with increased internalising and externalising mental health problems.[39]

Although empirical research in the African context is limited, existing work implicates overlapping factors in youth resiliency, as with those found in other parts of the world, and evidence for the capacity of youth to thrive after traumatic experiences, even in the most difficult environmental circumstances. In sum, these incorporate the attributes of children and adolescents themselves (e.g., biological factors, such as genetic and epigenetic processes, stress-hormone and immune responses; temperamental features; personality and intelligence), the attributes of the family and characteristics of the broader social environment, such as cultural and religious norms and community-level factors.

How does resilience play out in normal childhood development and in psychopathology?

As a dimensional construct, resilience manifests on a spectrum of negative physical and psychological outcomes to thriving in the context of adversity. Although early models of development assumed that only those with extraordinary coping abilities could thrive in adverse contexts, more recent evidence suggests that resilience is a result of normal adaptation that allows one to function effectively in a variety of domains. Evidence further suggests that successful adaptation to stressors during childhood/adolescence in critical domains, such as doing well academically and getting along with peers, predicts future successes.[40]

In children and adolescents, positive adaptation after exposure to risk is often viewed in terms of developmental expectations. This includes emotional health, maturity, academic achievement and interpersonal relationships.[41] There is, however, disagreement regarding the number of domains in which positive adjustment needs to occur for *at-risk* children to be considered resilient. Some researchers in the field have recommended success in one domain with at least average performance in other areas, others have recommended success in multiple domains, and yet others have prioritised certain domains over others.[42] Another consideration is whether *excellent* versus *adequate* functioning is required for one to be considered resilient.[43]

Positive adaptation to stress among youth may include developmental competence, i.e., academic success, culturally appropriate behaviour, successful relationships,

39 Betancourt et al., 2013, pp. 17–36.
40 Luthar et al., 2000, pp. 543–562; Masten, 2001, pp. 227.
41 Masten & O'Dougherty, 2009.
42 Masten & O'Dougherty, 2009.
43 Luthar et al., 2000, pp. 543–562; Masten & O'Dougherty, 2009.

and overall life satisfaction and well-being, as well as the absence of undesirable behaviours, while *poor adjustment* may result in multiple negative outcomes, namely, poor mental and physical health, criminal, behavioural or substance use problems.[44] Furthermore, there appears to be a dose-response relationship between childhood adversities and long-term negative outcomes, such that the number of stressful life events negatively correlates with resilience.[45]

Literature has documented numerous negative outcomes for children and adolescents during and after adversity. Early adversity has commonly been associated with poor mental health and psychiatric disorders, such as anxiety and depressive disorders, suicidality and substance abuse;[46] negative physical and behavioural health outcomes, including sexual disorders, sleep disturbances, obesity, smoking, somatic complaints and heart disease;[47] increased risk of victimisation and antisocial activities, such as violence, unemployment and homelessness;[48] and even death.[49]

Culture

It is important to note that the majority of the abovementioned research has been conducted in Western countries with a Eurocentric approach.[50] However, competent functioning needs to be considered with regard to standards of a given context, culture and the time in history.[51] Some researchers have highlighted the need to be cognisant that elements promoting resilience in one culture or context may not do so in another.[52] On the other hand, although evidence suggests that coping strategies have different consequences for adjustment in different cultures, given that resilience is a process of overcoming adversity, it should be independent of culture.[53] This does not mean that culture should be disregarded, but rather that differences between cultures need to be considered in relation to experiences of risk, developmental measures, behavioural outcomes, elements that promote resilience, and access to and usage of resources by youth.[54]

44 Luthar et al., 2000, pp. 543–562; Masten, 2001, pp. 227.
45 Anda et al., 2006, pp. 174–186; DuMont et al., 2007, pp. 255–274.
46 Afifi et al., 2008, pp. 946–952; Anda et al., 2006, pp. 174–186; Glaser, 2002, pp. 697–714; Kessler et al., 1997, pp. 1101–1119; MacMillan et al., 2001, pp. 1878–1883; McCord, 1983, pp. 265–270; Mullen et al., 1996, pp. 7–21.
47 Anda et al., 2008, pp. 396–403; Anda et al., 2006, pp. 174–186; Cunningham et al., 1994, pp. 233–245; Dube et al., 2002, pp. 713–725; Springer et al., 2003, pp. 864–870.
48 DuMont et al., 2007, pp. 255–274; Messman-Moore & Long, 2000, pp. 489–502.
49 Luecken & Gress, 2010, pp. 238–257; Meinck et al., 2015, pp. 81–107.
50 Ungar et al., 2008, pp. 63–64.
51 Masten & O'Dougherty, 2009.
52 Ungar et al., 2008, pp. 63–64.
53 Mancini & Bonanno, 2010, pp. 258–280.
54 Mancini & Bonanno, 2010, pp. 258–280; Ungar et al., 2008, pp. 63–64.

Cluver et al. (2015) note that similar negative outcomes to those found in the West have been observed in studies of African youth.[55] These include negligent behaviours and substance abuse,[56] psychological distress such as depression, anxiety and suicidality;[57] increased risk of revictimisation,[58] increased risk of poor physical health and HIV infection,[59] cognitive delay,[60] higher child death rates,[61] and exposure to drug and sex trades.[62] However, these may have even more severe consequences for children in Africa due to low levels of access to mental health and social services.[63]

These studies demonstrate the subtle influences of culture and context in the manifestation of child and adolescent resilience, particularly with regard to the promotion of factors that may bolster resilience and improve mental and physical health, and behavioural and psychosocial outcomes. Being resilient includes more than merely surviving risk and adversity—it also encompasses the ability to thrive in difficult conditions.

Resilience in the context of the Sustainable Development Goals (SDGs)

Social and physical ecologies can both compromise child and adolescent development and facilitate their coping. Ungar (2011; 2015) has identified five types of resources (social determinants of health) required to buffer the effects of stress and to help recovery in the face of psychopathology. These are: (1) the child's social capital (e.g., relationships with caregivers and cultural embeddedness); (2) human capital (e.g., ability to learn, play and work); (3) financial/institutional capital (e.g., health care, specialised support services at school and social welfare programmes); (4) natural capital (e.g., land, water and biological diversity); and (5) built capital (e.g., safe streets, public transport, housing, schools and recreation).[64]

55 Cluver et al., 2015, pp. 57–65.
56 Brown et al., 2009, pp. 447–455; Jewkes et al., 2006, pp. 2949–2961; Morojele & Brook, 2006, pp. 1163–1176.
57 Breuer et al., 2011, pp. 101–122; Cluver et al., 2009, pp. 185–199; Fincham et al., 2009, pp. 193–199; Frank-Briggs & Alikor, 2010, p. 246; Oladeji et al., 2010, pp. 186–191; Sherr et al., 2008, pp. 527–536; Wondie et al., 2011, pp. 2025–2041.
58 Ibanga, 2011; Jewkes et al., 2002, pp. 319–320.
59 Jewkes et al., 2010, pp. 833–841; Reza, 2009, pp. 1966–1972.
60 Sherr et al., 2014, pp. 251–259.
61 Mathews et al., 2012.
62 Cluver, 2011, pp. 27–29; Peltzer & Pengpid, 2008, pp. 1462–1478.
63 Sherr et al., 2014, pp. 2059–2074; WHO, 2011.
64 Ungar, 2011, pp. 1–17; Ungar, 2015, pp. 4–17.

It is clear that resilience is a key focus area in maintaining the developmental gains encompassed by the Sustainable Development Goals (SDGs),[65] however, it is not explicitly addressed in the psychosocial spheres we discussed earlier. Within the SDGs,[66] resilience is mentioned specifically in Goal 1: 'End poverty in all its forms everywhere'; Goal 11: 'Make cities and human settlements inclusive, safe, resilient and sustainable'; Goal 13: 'Take urgent action to combat climate change and its impacts'; and Goal 14: 'Conserve and sustainably use the oceans, seas and marine resources for sustainable development'. Within the context of goals 1, 11 and 13, resilience is framed primarily as resilience to shocks and disasters that can befall poor and vulnerable individuals and human settlements, which can occur in the context of climate change. Goal 14 aims to strengthen the resilience of marine and coastal ecosystems to avoid adverse environmental impacts. Thus, within the SDGs, resilience is viewed mainly as the capacity to withstand the effects of shocks and stressors. Building resilient infrastructure and implementing resilient agricultural practices are also mentioned in Goal 9: 'Build resilient infrastructure, promote sustainable industrialization and foster innovation'; and Goal 2: 'End hunger, achieve food security and improved nutrition and promote sustainable agriculture', respectively.

Resilience, however, is not mentioned specifically under Goal 3: 'Ensure healthy lives and promote well-being for all at all ages', and the focus targets of Goal 3 are largely related to reducing mortality and morbidity. Although resilience specifically is not mentioned under Goal 3, a positive focus on mental health is mentioned: '… promote mental health and well-being'.

In this regard, it is important to be cognisant of the complex interrelationship between the SDGs and childhood developmental outcomes. For instance, Goal 6: 'Ensure access to water and sanitation for all' can also influence childhood development. Anand and Roy (2016) demonstrated that improved access to safe drinking water and sanitation in sub-Saharan Africa and South Asia was associated with reductions in child morbidity and mortality.[67]

Resilience in terms of food security is investigated in Goal 1: 'End poverty in all its forms everywhere' and Goal 2: 'End hunger, achieve food security and improved nutrition and promote sustainable agriculture'. The Food Security Information Network (FSIN) has set up a resilience measurement Technical Working Group to develop common analytical approaches to measuring resilience in relation to food security across different settings. To this end, they have produced a collection of documents that serve as guidelines on best practice in the measurement of resilience, 'FSIN Technical Series numbers 1 to 7' (http://www.fsincop.net/topics/

65 Bahadur et al., 2015, pp. 1–7.
66 United Nations (UN), 2016.
67 Anand & Roy, 2016.

resilience-measurement/en/). For their purposes, they have defined resilience as 'the capacity that ensures adverse stressors and shocks do not have long-lasting adverse development consequences' (http://www.fsincop.net/topics/resilience-measurement/en/). Although their primary aim is examining resilience in relation to poverty and food insecurity, their definition can be applied to different contexts. The first principle regarding the measurement of resilience is that 'Resilience is a Normatively Indexed Capacity', meaning that resilience capacity should be indexed to a given developmental outcome with a normative threshold below which the well-being of an individual, household or community is unacceptable. Applying this concept to child development, resilience may then be viewed as the capacity that prevents a child from falling below a normatively defined level of developmental achievements and general well-being.

Bahadur et al. (2015) have suggested that, in the context of the SDGs, a three-step approach be used when evaluating resilience. Their approach measures resilience capacities (the ability to deal with stressors) as step 1, then measures the stressors and hazards to which an individual is exposed in step 2, and in step 3, measures the resilient development outcomes following exposure to hazards. This approach takes into consideration the underlying ability of an individual to deal with stressors and whether they demonstrate increased resilience following exposure to different stressors and shocks.[68] They also propose that the resilience of social systems be viewed in terms of a set of interrelated capabilities: to anticipate and reduce the impact of stressors, to absorb and cope with the impact of stresses, and to adapt successfully following stressors.

Resilience in childhood: How can we measure it?

Resilience is difficult to measure and define. Luecken and Gress (2010) emphasise that we cannot fully understand the intricacies of resilience and its multiple pathways without consensus on how to measure it. Improper measurement may lead to improper data and interpretation, and a lack of advancement on contemporary theories of resilience.[69]

Various tools have been developed to measure resilience. These tools are influenced both by the theoretical basis on which resilience is defined, as well as the context for which these tools are developed. Tools utilised in children and adolescents are largely self-administered and, as such, designed mainly for use in older children and adolescents. Most resilience tools tend to measure individual characteristics related to resilience and vary in the extent to which they also measure external factors, such as family, peer and community effects.

68 Bahadur et al., 2015, pp. 1–7.
69 Luecken & Gress, 2010, pp. 238–257.

Systematic reviews have been conducted to evaluate resilience measures in children and adolescents.[70] Of note, only two resilience scales, the Resilience Questionnaire for Middle-Adolescents in Township Schools (R-MATS)[71] and the Youth Ecological-Resilience Scale (YERS),[72] have been developed specifically to measure resilience in children and adolescents in an African setting. Only one measure, the Child and Youth Resilience Measure (CYRM-28),[73] has been developed across international sites, including three African countries.

We elaborate on individual tools below. We include measures that have been designed in adult populations, but where psychometric properties have been evaluated in at least one child and adolescent sample. Only the R-MATS, the YERS, and the two measures designed for use in adult populations have been validated in adolescents from African settings.

Measures designed specifically for children and adolescents

The Adolescent Psychological Resilience Scale (APRS)[74]

The APRS was designed to assess the psychological quality of resilience in Turkish high-school-aged students. The scale was designed based on items used in other resilience scales and on written feedback from 30 adolescents regarding their concept of resilience. Factor analysis was performed and psychometric properties were evaluated in 347 high school students aged 14–17 years. The scale has 29 items on a four-point Likert scale and evaluates six factors: (1) Family support; (2) Confidant–friend support; (3) School support; (4) Adjustment; (5) Sense of struggle; and (6) Empathy. The scale has not yet been validated or utilised outside of Turkey. The scale is available as an appendix to the validation article.

The Adolescent Resilience Scale (ARS)[75]

The ARS was developed to assess resilience in Japanese youth and was designed based on prior resilience research. The ARS consists of 21 items, rated on a five-point Likert scale and measures three factors: (1) Novelty seeking, (2) Emotional regulation, and (3) Positive future orientation. Although the measure is called an adolescent scale,

70 Ahern et al., 2006, pp. 103–125; Smith-Osborne & Whitehill Bolton, 2013, pp. 111–126; Windle et al., 2011, p. 8.
71 Mampane, 2012, pp. 405–408.
72 Van Breda, 2016, pp. 2–34.
73 Ungar & Liebenberg, 2011, pp. 126–149.
74 Bulut et al., 2013, pp. 21–32.
75 Oshio et al., 2003, pp. 1217–1222.

it was validated in a sample of 207 undergraduate students aged 19 to 23 years.[76] Construct validity was demonstrated to be good with three clusters emerging: (1) Well-adjusted (mentally healthy with little negative life experiences); (2) Vulnerable (poor mental health and many negative life experiences); and (3) Resilient (mentally healthy and many negative life experiences) in the same sample of students.[77] The ARS has not been validated outside of Japan and has not been used in research in Africa. The scale is available in English, Japanese, Chinese, Spanish and Romanian from the first author's website: http://www.f.waseda.jp/oshio.at/index_e.html

The Child and Youth Resilience Measure (CYRM-28)[78]

The CYRM-28 was developed as a cross-cultural measure of resilience, evaluating both internal and external factors associated with resilience. The tool was developed using a mixed-methods methodology utilising both qualitative and quantitative approaches. The CYRM-28 consists of 28 items on a five-point Likert scale and evaluates four clusters related to resilience: individual, relational, community and cultural. The tool was developed and evaluated in adolescents and young adults from 11 countries, including three African sites: Serekunda in the Gambia, Njoro in Tanzania and Cape Town in South Africa. The pilot measure, consisting of 58 items, was administered to 1 451 participants (216 from Africa) aged between 12 and 23 years and qualitative interviews were conducted with 89 youths (15 from Africa). The items were reduced to those that best represented resilience across all sites.

The CYRM-28 was further validated in two samples of Canadian youths, utilising mental health services and/or social services.[79] In the first sample of 497 youths (mean age 16.9 years), exploratory factor analysis identified three factors (individual, relational and contextual) and in the second sample of 410 youths (mean age 16.0 years), confirmatory factor analysis was performed. The CYRM-28 was further validated in a sample of 593 at-risk adolescents, aged 12–17 years[80] in New Zealand and a four-factor structure was identified (individual, family, social/cultural context and spiritual/community context). The tool has been abbreviated to a shorter form, the CYRM-12, and tested in a sample of 122 mental health and/or social service-using youths, aged 14–22 years, and was then validated in 1 494 school-going students aged 10–18 years.[81] The French version of the CYRM-28 was validated in 589 urban youths aged 15–18 years and 246 rural youths aged 14–19 years in Canada and revealed

76 Oshio et al., 2003, pp. 1217–1222.
77 Oshio et al., 2003, pp. 1217–1222.
78 Ungar & Liebenberg, 2011, pp. 126–149.
79 Liebenberg et al., 2012, pp. 219–226.
80 Sanders et al., 2015.
81 Liebenberg et al., 2013, pp. 131–135.

a three-factor structure (individual/social, family and community/spiritual).[82] The psychometric properties of both the Chinese CYRM-28[83] and CYRM-12[84] have been evaluated in Chinese adolescents. The psychometric properties of the Turkish CYRM-12 have been investigated in 256 students age 11–16 years.[85] The Persian version of the CYRM-28 was validated in Iranian adolescents aged 12–19 years.[86] Exploratory analysis was performed in 351 adolescents and confirmatory factor analysis in 352 adolescents. All items related to individual resources were removed in the analysis and the scale was reduced to 11 items, where three factors (peer resources, caregiver resources, and religious and cultural resources) were identified. The scale is available from the website http://www.resilienceresearch.org

The Resilience Scale for Adolescents (READ)[87]

The READ was designed based on prior resilience research and measures five factors: (1) Personal competence, (2) Social competence, (3) Structured style, (4) Family cohesion, and (5) Social resources. These five factors represent three categories of resilience, namely, individual disposition, family support and external support systems. The READ contains 28 positively phrased items rated using a five-point Likert scale. The READ was initially validated in Norway with 425 adolescents aged 13 to 15 years and demonstrates acceptable psychometric properties. It has since been validated with a sample of 6 723 Norwegian students aged 18–20 years,[88] 6 085 Irish adolescents aged 12–18 years,[89] and 840 adolescents aged 12–17 years in Mexico.[90] The READ has not yet been validated in Africa, but was used to measure resilience in a study of 177 adolescents aged 12–22 years from high schools in the Western Cape, South Africa.[91] The scale is available on request from the authors.

The Resilience Questionnaire for Middle-Adolescents in Township Schools (R-MATS)[92]

The R-MATS was designed to evaluate resilience in adolescents from low-resource neighbourhoods in South Africa. The R-MATS consists of two sections: Section A evaluates for systemic and individual risk factors and Section B consists of 24 items,

82 Daigneault et al., 2013, pp. 160–171.
83 Xiang et al., 2014, pp. 5–10.
84 Mu & Hu, 2016, pp. 332–339.
85 Arslan, 2015, pp. 1–12.
86 Zand et al., 2006, pp. 1–13.
87 Hjemdal et al., 2006, p. 84.
88 Von Soest et al., 2010, pp. 215–225.
89 Kelly et al., 2016.
90 Ruvalcaba-Romero et al., 2015, pp. 21–34.
91 Harrison, 2014.
92 Mampane, 2014, pp. 1–11.

measured on a four-point Likert scale evaluating resilient behaviour. The R-MATS was designed based on resilience literature and was then tested in a township to measure four factors: (1) Confidence and internal locus of control, (2) Social support, (3) Toughness and commitment, and (4) Achievement orientation. The psychometric properties were evaluated in 213 black adolescents aged 14–16 years from a low-income community in Gauteng, South Africa, and further factor analysis was conducted in 291 Grade nine adolescents from the same environment.[93]

The Resilience Scale for Early Adolescents (RSEA)[94]

The RSEA was developed to assess resilience in Turkish early adolescents (12–14 years) based on prior research and on feedback from a focus group of adolescents. The scale contains 23 items on a four-point Likert scale and consists of four factors: (1) Self-originated resilience, (2) Family originated resilience, (3) Friends originated resilience and (4) School/teacher originated resilience. Exploratory factor analysis was performed on data from 459 students and confirmatory factor analysis on 201 students, and test–retest reliability was performed on a sample of 50 students. The RSEA has been utilised only in a study of Turkish adolescents by the same authors.[95]

The Resilience Skills and Abilities Scale (RSAS)[96]

The RSAS was originally named the Adolescent Resiliency Belief System Scale[97] and was developed based on Mrazek and Mrazek (1987) and their cognitive appraisal theory of resilience. In this context, resilience is viewed as a set of psychological skills and abilities that enable individuals to deal better with stressful situations.[98] The scale contains 35 items measured on a five-point Likert scale and consists of three subscales: Future orientation, Active skill acquisition and Independence/Risk taking. The scale was developed in a sample of 408 ninth grade high school students from the United States, and the measure's stability over time was demonstrated in a subsample of 50 of the 408 students. All but one of the original subscales was demonstrated to distinguish between 30 institutionalised adolescents and the original sample of students. The scale was then revised and validated in 392 adolescents aged 12 to 18 years. The RSAS has not been validated in settings outside the United States and has not yet been used in studies in Africa. The scale is available from the authors.

93 Mampane, 2014, pp. 1–11.
94 Baltaci & Karatas, 2014, pp. 458–464.
95 Baltaci & Karatas, 2014, pp. 458–464.
96 Jew et al., 1999, p. 75.
97 Jew, 1997.
98 Mrazek & Mrazek, 1987, pp. 357–366.

The Resiliency Scale for Children and Adolescents (RSCA)[99]

The Resiliency Scale for Children and Adolescents (RSCA) was designed to be used in preventive screening of psychological vulnerability in children and adolescents aged nine to 18 years. The RSCA was designed based on prior research and developmental theory.[100] It consists of three global scales of 20–24 items, each entailing 10 subscales rated using a five-point Likert scale. The scales measure personal attributes as follows: Sense of mastery (optimism, self-efficacy and adaptability), Sense of relatedness (trust, support, comfort and tolerance) and Emotional reactivity (sensitivity, recovery and impairment). Sense of mastery and Sense of relatedness are scales designed to measure resilience, whereas the Emotional reactivity scale measures vulnerability. The RCSA resilience and vulnerability scores can be used to calculate a vulnerability index, which compares psychological vulnerability to resilience factors. The internal validity and invariance according to age and gender[101] of the RCSA was determined in 650 children and adolescents aged nine to 18 years. The RCSA was initially validated in a nonclinical sample of 200 adolescents and a clinical sample of 169 adolescents aged 15 to 18 years.[102] The RSCA has not been validated in settings outside the United States. However, it has been used in a study of 83 Kenyan youths[103] and in a study of 495 adolescents in South Africa.[104] It can be purchased online at Pearsonclinical.com.

The Youth Ecological-Resilience Scale (YERS)[105]

The YERS was developed to measure resilience within an ecological framework, assessing both personal and environmental factors and the interaction between them. The scale was designed based on previous research into resilience, resilience theories, and existing resilience scales. It was designed specifically to assess young people transitioning out of alternative care (residential and foster care) but may have broader applications. The YERS is a multidimensional scale and comprises 117 items measuring 21 constructs and is measured on a five-point Likert scale. The 21 constructs include: family relationships, friend relationships, teacher relationships, community relationships, role-model relationships, love relationships, community safety, family financial security, social activities, interdependent problem-solving, self-efficacy, resourcefulness, team work, empathy, positive learning experience, high self-expectations, ability to bounce back, optimism, self-esteem, distress tolerance

99 Prince-Embury, 2008, pp. 41–56.
100 Prince-Embury, 2008, pp. 41–56.
101 Prince-Embury& Courville, 2008, pp. 26–40.
102 Prince-Embury, 2008, pp. 41–56.
103 Tignor & Prince-Embury, 2013, pp. 257–278.
104 Van Wyk, 2011.
105 Van Breda, 2016, pp. 2–34.

and spirituality. The scale was designed and validated in a sample of 575 young people, aged 14–21 years, from three provinces in South Africa (Western Cape, KwaZulu-Natal and Gauteng). The YERS can be requested from the authors.

Youth Resiliency: Assessing Developmental Strengths (YR: ADS)[106]

The YR: ADS was developed based on prior research regarding adolescent resilience and takes into consideration intrinsic and extrinsic factors. The psychometric properties of the YR: ADS was examined in a sample of 2 291 Canadian school-going adolescents aged 11–14 years. The questionnaire is divided into three sections with 94 items measuring resilience, items assessing possible at-risk behaviours and demographic questions. The 94 resilience items are measures on a five-point Likert scale and have 10 factor subscales: Family, Community, Peers, Work (commitment to learning), School (culture), Social sensitivity, Cultural sensitivity, Self-concept, Empowerment and Self-control. The tools have not been used in research in African settings. Assessments with the YR: ADS are offered as a service on the website: http://www.resil.ca/

Measures designed for adult samples

The Connor-Davidson Resilience Scale (CD-RISC)[107]

The CD-RISC was developed to assess resilience and as a 'change' measure of clinical treatment response. The scale is based on prior research into resilience and adjustment following stressful or traumatic experiences. The scale consists of 25 items on a five-point Likert scale and scores range from 0–100, with higher scores indicating greater resilience. The scale evaluates five factors:

Factor 1: personal competence, high standards, tenacity;
Factor 2: trust in one's instinct, tolerance of negative affect and strengthening effects;
Factor 3: positive acceptance of change and secure relationships;
Factor 4: control; and
Factor 5: spiritual influences.

The original validation sample consisted of six groups (n=827); general population (n=577), primary care (n=139), psychiatric outpatients (n=43); generalised anxiety disorder study participants (n=25), and PTSD clinical trial participants (n=44). There is also a 10 item (CD-RISC 10)[108] and a two item (CD-RISC 2)[109] version of the

106 Donnon et al., 2003, pp. 23–28.
107 Connor & Davidson, 2003, pp. 76–82.
108 Campbell-Sills & Stein, 2007, pp. 1019–1028.
109 Vaishnavi et al., 2007, pp. 293–297.

scale. The CD-RISC has been translated into many languages and studied in a variety of populations. Although the CD-RISC was originally validated in adult samples, its psychometric properties and factor structure have been examined in adolescents as well. In a South African sample of 701 adolescents, the reliability coefficient was 0.93, however, instead of the original five factors, a three-factor structure was identified (tenacity, adaptation, and spirituality).[110] The Chinese version of the CD-RISC was validated in 2 914 adolescents aged 13–17 years.[111] The Khmer version of the CD-RISC-10 was validated in 798 Cambodian adolescents and young adults (aged 14–24 years).[112] The CD-RISC has been utilised to evaluate resilience in a sample of 787 South African young people, aged 11 to 23 years,[113] another sample of 1 149 school-attending youths, aged 13–23 years,[114] and in 41 South African adolescent rape survivors (14–18 years).[115] The scale is available from the first authors and can be requested via the website http://www.cd-risc.com/

The Resilience Scale (RS)[116]

The RS was designed based on prior research into resilience and a qualitative study of women who had adapted well following a stressful event.[117] The scale is based on five factors of resilience, namely, Perseverance, Equanimity, Self-reliance, Meaningfulness and Existential aloneness. The scale consists of 25 items scored on a seven-point Likert scale and factor analysis identified two factors: (1) Personal competence and (2) Acceptance of self and life. The RS was validated in 810 older adults, aged 53–95 years.[118] The scale has been translated into various languages and used across different settings. Although the psychometric properties and the RS have not been investigated in depth in adolescent samples, the scale has been used in 51 10th–11th grade adolescents[119] and in 59 homeless youth aged 15–22 years.[120] The RS has been validated in 284 Nigerians aged 16–30 years, although only 22 of the 25 items were found to be culturally relevant.[121] The RS has been utilised to study resilience in 426 South African adolescents, aged 15–16 years[122] and in 1 060 Kenyan

110 Jorgensen & Seedat, 2008, pp. 23–32.
111 Yu et al., 2011, pp. 218–224.
112 Duong & Hurst, 2016, p. 297.
113 Bruwer et al., 2008, pp. 195–201; Fincham et al., 2009, pp. 193–199.
114 Martin et al., 2014, pp. 5–12.
115 Van der Walt et al., 2014, pp. 239–249.
116 Wagnild & Young, 1993, pp. 165–178.
117 Wagnild & Young, 1993, pp. 165–178.
118 Wagnild & Young, 1993, pp. 165–178.
119 Hunter & Chandler, 1999, pp. 243–247.
120 Rew et al., 2001, pp. 33–40.
121 Oladipo & Idemudia, 2015, pp. 57–65.
122 Mathibe, 2015.

orphans and vulnerable children under the age of 22 years.[123] The psychometric properties of the shortened version of the RS, the RS-14,[124] were evaluated in medical students (mean age 22.5) in Nigeria.[125] The RS-14 has been used to study resilience in 329 Nigerian adolescents aged 12–18 years[126] and 100 orphaned Ghanaian children aged 7–17 years.[127] The RS is available for purchase from the website https://www.resiliencescale.com/

In sum, while there may be global aspects of resilience, which are relevant to youth internationally, resilience-related patterns of functioning and expression are contextually distinct, and this needs to be considered when developing scales to measure resilience.[128]

Assessment

Ungar (2015) has proposed a number of diagnostic criteria for resilience that account for both the interaction of *social and physical ecological factors* and *individual* child factors. A diagnosis of resilience is multidimensional and covers a number of aspects: (1) the presence and experience of adversity, (2) individual and contextual dimensions of resilience, and (3) temporal and cultural influences on protective and promotive factors for nurturing and maintaining well-being.[129] Assessment should begin with a detailed assessment of the adversity, its severity and chronicity, associated risk factors, attributions of causality, temporality (e.g., developmental age and stage of the child, which determines coping strategies), and cultural and contextual factors that influence how adversity is experienced. In this way, 'risk and resilience is thought of as involving multiple biological, psychological and social systems and their interactions'.[130] The second step is an examination of individual characteristics of resilience (e.g., temperament, personality, cognitions, locus of control and self-regulation), which are more likely to influence resilience when adversity is less severe and chronic (compared to when it is more severe and chronic).[131] In addition to individual characteristics, contextual dimensions must be considered (i.e., the capacity of the environment to provide resources). In this regard, the following requirements (albeit minimally) should be met in the last six months: *availability*

123 Goodman et al., 2016, pp. 2229–2246.
124 Wagnild & Guinn, 2011.
125 Abiola & Udofia, 2011, p. 509.
126 Chukwuorji & Ajaero, 2014, p. 86.
127 Yendork & Somhlaba, 2016, pp. 429–443.
128 Oladipo & Idemudia, 2015, pp. 57–65.
129 Ungar, 2015, pp. 4–17.
130 Ungar, 2013, pp. 255–266; 2015, pp. 4–17.
131 Ungar, 2015, pp. 4–17.

and accessibility of individual, family, community and political resources, *purposeful strategies* (e.g., biological, emotional, psychological, social, political and spiritual) *to use these resources*, *social recognition* of how the child or adolescent copes with adversity, and *the extent to which the environment around the child has the capacity to adapt* (i.e., if caregivers, service providers, schools and communities provide greater capacity, the more likely these resources are to be taken up and engaged with to improve outcomes). The third step encompasses an assessment of temporal and cultural factors in the context of coping strategies (i.e., adaptive or maladaptive). Age, gender, genetic factors, family and system-level factors can influence a child's coping strategies.

In summary, the diagnosis is predicated on: (1) above normal or atypical exposure to adversity, or to experience of events that threaten well-being, regardless of the presence of emotional or behavioural problems in the child; (2) sufficient individual capacities to sustain resilience; and (3) coping strategies that are either experienced and/or perceived to be adaptive.[132] A more fine-grained, nuanced assessment of resilience can inform the range of interventions that may be needed to promote and maintain well-being. Khanlou and Wray (2014) have pointed to the 'policy gap' that needs to be addressed by developing and implementing evidence-based resilience approaches that are characterised by policy coherence, local integrated action and community engagement.[133] School-based interventions, which have been a focus in research, should extend beyond the boundary of 'school walls' and be complemented by the powerful influence of effective community interventions (e.g., early child development programmes, home visiting and improving life chances for disadvantaged or marginalised children).[134]

Conclusion

The relationship between resilience and mental health is overlapping, interlinked and bidirectional. Investing in Africa's youth, via assessing and developing strengths to develop positive coping skills and reduce violence and trauma, may lead to long-term gains—for both the individual and the society—and to the achievement of the SDGs, particularly Goal 3. Micro- and macro-level social determinants interact with individual child factors and should be duly considered. Diagnosing resilience is the first step to identifying youth who are at risk, evaluating interventions both quantitatively and qualitatively, and developing effective prevention strategies for adversity. For this, longitudinal studies that examine the effect of change in cumulative

132 Ungar, 2015, pp. 4–17.
133 Khanlou & Wray, 2014, pp. 64–79.
134 Khanlou & Wray, 2014, pp. 64–79.

promotive factors over time, and the developmental timing of these promotive factors in mitigating or protecting against risks, will be crucial.[135]

References

Abiola, T. & Udofia, O. (2011). Psychometric assessment of the Wagnild and Young's resilience scale in Kano, Nigeria. *BMC Research Notes*, 4(1), 509.

Afifi, T.O., Enns, M.W., Cox, B.J., Asmundson, G.J., Stein, M. B. & Sareen, J. (2008). Population attributable fractions of psychiatric disorders and suicide ideation and attempts associated with adverse childhood experiences. *American Journal of Public Health*, 98(5), 946–952.

Agnafors, S., Svedin, C.G., Oreland, L., Bladh, M., Comasco, E. & Sydsjö, G. (2016). A biopsychosocial approach to risk and resilience on behavior in children followed from birth to age 12. *Child Psychiatry and Human Development*, 48(4), 584–596.

Ahern, N.R. (2006). Adolescent resilience: An evolutionary concept analysis. *Journal of Pediatric Nursing*, 21(3), 175–185.

Ahern, N.R., Kiehl, E.M., Lou Sole, M. & Byers, J. (2006). A review of instruments measuring resilience. *Issues in Comprehensive Pediatric Nursing*, 29(2), 103–125.

Anand, A. & Roy, N. (2016). Transitioning toward sustainable development goals: The role of household environment in influencing child health in Sub-Saharan Africa and South Asia using recent demographic health surveys. *Frontiers in Public Health*, 4, 87.

Anda, R.F., Brown, D.W., Dube, S.R., Bremner, J.D., Felitti, V.J. & Giles, W.H. (2008). Adverse childhood experiences and chronic obstructive pulmonary disease in adults. *American Journal of Preventive Medicine*, 34(5), 396–403.

Anda, R.F., Felitti, V.J., Bremner, J.D., Walker, J.D., Whitfield, C., Perry, B.D., … Giles, W.H. (2006). The enduring effects of abuse and related adverse experiences in childhood. *European Archives of Psychiatry and Clinical Neuroscience*, 256(3), 174–186.

Arslan, G. (2015). Psychometric properties of child and youth resilience measure (CYRM-12): The study of reliability and validity. *Ege Eğitim Dergisi*, 16(1), 1–12.

Bahadur, A., Lovell, E., Wilkinson, E. & Tanner, T. (2015). Resilience in the SDGs. *ODI Briefing*, 1–7.

Baltaci, H.Ş. & Karatas, Z. (2014). Validity and reliability of the resilience scale for early adolescents. *Procedia – Social and Behavioral Sciences*, 131, 458–464.

Betancourt, T.S., Borisova, I., Williams, T. P., Meyers-Ohki, S.E., Rubin-Smith, J.E., Annan, J. & Kohrt, B.A. (2013). Research review: Psychosocial adjustment and mental health in former child soldiers: A systematic review of the literature and recommendations for future research. *Journal of Child Psychology and Psychiatry*, 54(1), 17–36.

Betancourt, T.S., Meyers-Ohki, S.E., Charrow, A. & Hansen, N. (2013). Annual research review: Mental health and resilience in HIV/AIDS-affected children: A review of the literature and recommendations for future research. *Journal of Child Psychology and Psychiatry*, 54(4), 423–444.

135 Zimmerman et al., 2013, pp. 215–220.

Bretherton, I. (1992). The origins of attachment theory: John Bowlby and Mary Ainsworth. *Developmental Psychology*, 28(5), 759.

Breuer, E., Myer, L., Struthers, H. & Joska, J.A. (2011). HIV/AIDS and mental health research in sub-Saharan Africa: A systematic review. *African Journal of AIDS Research*, 10(2), 101–122.

Brown, L., Thurman, T., Rice, J., Boris, N., Ntaganira, J., Nyirazinyoye, L., … Snider, L. (2009). Impact of a mentoring program on psychosocial wellbeing of youth in Rwanda: Results of a quasi-experimental study. *Vulnerable Children and Youth Studies*, 4(4), 288–299.

Bruwer, B., Emsley, R., Kidd, M., Lochner, C. & Seedat, S. (2008). Psychometric properties of the Multidimensional Scale of Perceived Social Support in youth. *Comprehensive Psychiatry*, 49(2), 195–201.

Bulut, S., Doğan, U. & Altundağ, Y. (2013). Adolescent Psychological Resilience Scale: Validaty and reliability study. *Suvremena Psihologija*, 16, 21–32.

Campbell-Sills, L. & Stein, M.B. (2007). Psychometric analysis and refinement of the connor–davidson resilience scale (CD-RISC): Validation of a 10-item measure of resilience. *Journal of Trauma Stress*, 20(6), 1019–1028.

Choe, DE., Zimmerman, M.A. & Devnarain, B. (2012). Youth violence in South Africa: Exposure, attitudes, and resilience in Zulu adolescents. *Violence and Victims*, 27(2), 166–181.

Chukwuorji, J.C. & Ajaero, C.K. (2014). Resilience in Igbo Rural Community Adolescents and Young Adults. *Journal of Social Sciences*, 10(3), 86.

Cluver, L. (2011). Children of the AIDS pandemic. *Nature*, 474, 27–29.

Cluver, L., Gardner, F. & Operario, D. (2009). Poverty and psychological health among AIDS-orphaned children in Cape Town, South Africa. *AIDS Care*, 21, 732–741.

Cluver, L., Hodes, R.J., Toska, E., Kidia, K.K., Orkin, F.M., Sherr, L. & Meinck, F. (2015). 'HIV is like a tsotsi. ARVs are your guns': Associations between HIV-disclosure and adherence to antiretroviral treatment among adolescents in South Africa. *AIDS*, 29(1), 57–65.

Collishaw, S., Gardner, F., Aber, J.L. & Cluver, L. (2016). Predictors of mental health resilience in children who have been parentally bereaved by AIDS in urban South Africa. *Journal of Abnormal Child Psychology*, 44(4), 719–730.

Connor, K.M. (2006). Assessment of resilience in the aftermath of trauma. *Journal of Clinical Psychiatry*, 67(2), 46–49.

Connor, K.M. & Davidson, J. R. (2003). Development of a new resilience scale: The Connor-Davidson resilience scale (CD-RISC). *Depression and anxiety,* 18(2), 76–82.

Cortina, M.A., Fazel, M., Hlungwani, T.M., Kahn, K., Tollman, S., Cortina-Borja, M. & Stein, A. (2013). Childhood psychological problems in school settings in rural Southern Africa. *PLOS ONE*, 8(6), e65041.

Cortina, M.A., Stein, A., Kahn, K., Hlungwani, T.M., Holmes, E.A. & Fazel, M. (2016). Cognitive styles and psychological functioning in rural South African school students: Understanding influences for risk and resilience in the face of chronic adversity. *Journal of Adolescence*, 49, 38–46.

Cunningham, R.M., Stiffman, A.R., Doré, P. & Earls, F. (1994). The association of physical and

sexual abuse with HIV risk behaviors in adolescence and young adulthood: Implications for public health. *Child Abuse & Neglect*, 18(3), 233–245.

Daigneault, I., Dion, J., Hébert, M., McDuff, P. & Collin-Vézina, D. (2013). Psychometric properties of the Child and Youth Resilience Measure (CYRM-28) among samples of French Canadian youth. *Child Abuse & Neglect*, 37(2), 160–171.

De Silva, M.J., McKenzie, K., Harpham, T. & Huttly, S.R. (2005). Social capital and mental illness: A systematic review. *Journal of Epidemiology and Community Health*, 59(8), 619–627.

Donnon, T., Hammond, W. & Charles, G. (2003). Youth resiliency: Assessing students' capacity for success at school. *Teaching and Learning*, 1(2), 23–28.

Dube, S.R., Anda, R.F., Felitti, V.J., Edwards, V.J. & Croft, J.B. (2002). Adverse childhood experiences and personal alcohol abuse as an adult. *Addictive Behaviors*, 27(5), 713–725.

DuMont, K.A., Widom, C.S. & Czaja, S.J. (2007). Predictors of resilience in abused and neglected children grown-up: The role of individual and neighborhood characteristics. *Child Abuse & Neglect*, 31(3), 255–274.

Duong, C. & Hurst, C.P. (2016). Reliability and validity of the Khmer version of the 10-item Connor-Davidson Resilience Scale (Kh-CD-RISC10) in Cambodian adolescents. *BMC Research Notes*, 9(1), 297.

Fincham, D.S., Altes, L.K., Stein, D.J. & Seedat, S. (2009). Posttraumatic stress disorder symptoms in adolescents: Risk factors versus resilience moderation. *Comprehensive Psychiatry*, 50(3), 193–199.

Frank-Briggs, A.I. & Alikor, E. (2010). Anxiety disorder amongst secondary school children in an urban city in Nigeria. *International Journal of Biomedical Science*, 6(3), 246.

Glaser, D. (2002). Emotional abuse and neglect (psychological maltreatment): A conceptual framework. *Child Abuse & Neglect*, 26(6), 697–714.

Goodman, M.L., Lloyd, L.E., Selwyn, B.J., Morgan, R.O., Mwongera, M., Gitari, S. & Keiser, P.H. (2016). Factors associated with general self-efficacy and resilience among youth heads of households in Kenya. *Journal of Health Psychology*, 21(10), 2229–2246.

Hall, K.S., Beckham, J.C., Bosworth, H.B., Sloane, R., Pieper, C.F. & Morey, M.C. (2014). PTSD is negatively associated with physical performance and physical function in older overweight military Veterans. *Journal of Rehabilitation Research and Development*, 51(2), 285.

Harrison, C. (2014). The experience of stress in adolescents living in low-income communities in the Western Cape: The role of self-esteem, coping and perceived social support. Unpublished Master's thesis, Stellenbosch University.

Hjemdal, O., Friborg, O., Stiles, T.C., Martinussen, M. & Rosenvinge, J.H. (2006). A new scale for adolescent resilience: Grasping the central protective resources behind healthy development. *Measurement and Evaluation in Counseling and Development*, 39(2), 84.

Hoffman, D.M. (2010). Risky investments: Parenting and the production of the 'resilient child'. *Health, Risk & Society*, 12(4), 385–394.

Hunter, A.J. & Chandler, G.E. (1999). Adolescent resilience. *Journal of Nursing Scholarship*,

31(3), 243–247.

Ibanga, A. (2011). Sexual victimization, partner aggression and alcohol consumption. *African Journal of Drug and Alcohol Studies*, 10(1).

Jew, C.L. (1997). *Adolescent Resiliency Belief System Scale*. Thousand Oaks, CA: California Lutheran University.

Jew, C.L., Green, K.E. & Kroger, J. (1999). Development and validation of a measure of resiliency. *Measurement and Evaluation in Counseling and Development*, 32(2), 75.

Jewkes, R., Dunkle, K., Koss, M.P., Levin, J.B., Nduna, M., Jama, N. & Sikweyiya, Y. (2006). Rape perpetration by young, rural South African men: Prevalence, patterns and risk factors. *Social Science & Medicine*, 63(11), 2949–2961.

Jewkes, R., Levin, J., Mbananga, N. & Bradshaw, D. (2002). Rape of girls in South Africa. *The Lancet*, 359(9303), 319–320.

Jewkes, R.K., Dunkle, K., Nduna, M., Jama, P.N. & Puren, A. (2010). Associations between childhood adversity and depression, substance abuse and HIV and HSV2 incident infections in rural South African youth. *Child Abuse & Neglect*, 34(11), 833–841.

Jorgensen, I.E. & Seedat, S. (2008). Factor structure of the Connor-Davidson Resilience Scale in South African adolescents. *International Journal of Adolescent Medicine and Health*, 20(1), 23–32.

Kaufman, J., Yang, B.-Z., Douglas-Palumberi, H., Grasso, D., Lipschitz, D., Houshyar, S., … Gelernter, J. (2006). Brain-derived neurotrophic factor–5-HTTLPR gene interactions and environmental modifiers of depression in children. *Biological Psychiatry*, 59(8), 673–680.

Kaufman, J., Yang, B.-Z., Douglas-Palumberi, H., Houshyar, S., Lipschitz, D., Krystal, J.H. & Gelernter, J. (2004). Social supports and serotonin transporter gene moderate depression in maltreated children. *Proceedings of the National Academy of Sciences of the United States of America*, 101(49), 17316–17321.

Kelly, Y., Fitzgerald, A. & Dooley, B. (2016). Validation of the Resilience Scale for Adolescents (READ) in Ireland: A multi-group analysis. *International Journal of Methods in Psychiatric Research*, 26(2).

Kessler, R.C., Davis, C.G. & Kendler, K.S. (1997). Childhood adversity and adult psychiatric disorder in the US National Comorbidity Survey. *Psychological Medicine*, 27(5), 1101–1119.

Khanlou, N. & Wray, R. (2014). A whole community approach toward child and youth resilience promotion: A review of resilience literature. *International Journal of Mental Health and Addiction*, 12(1), 64–79.

Kidman, R. & Palermo, T. (2016). The relationship between parental presence and child sexual violence: Evidence from thirteen countries in sub-Saharan Africa. *Child Abuse & Neglect*, 51, 172–180.

Lazarus, R.S. (1993). Coping theory and research: Past, present, and future. *Psychosomatic Medicine*, 55(3), 234–247.

Liebenberg, L., Ungar, M. & LeBlanc, J.C. (2013). The CYRM-12: A brief measure of resilience. *Canadian Journal of Public Health*, 104(2), 131–135.

Liebenberg, L., Ungar, M. & Vijver, F.V.d. (2012). Validation of the child and youth resilience

measure-28 (CYRM-28) among Canadian youth. *Research on Social Work Practice*, 22(2), 219–226.

Luecken, L.J. & Gress, J.L. (2010). Early adversity and resilience in emerging adulthood. In J.W. Reich, A.J. Zautra & J.S. Hall (eds). *Handbook of Adult Resilience*. New York, London: The Guilford Press, pp. 238–257.

Luthar, S.S. (2003). *Resilience and Vulnerability: Adaptation in the Context of Childhood Adversities*. Cambridge: Cambridge University Press.

Luthar, S.S., Cicchetti, D. & Becker, B. (2000). The construct of resilience: A critical evaluation and guidelines for future work. *Child Development*, 71(3), 543–562.

MacMillan, H.L., Fleming, J.E., Streiner, D.L., Lin, E., Boyle, M.H., Jamieson, E., … Beardslee, W.R. (2001). Childhood abuse and lifetime psychopathology in a community sample. *American Journal of Psychiatry*, 158(11), 1878–1883.

Mampane, R. (2012). Psychometric properties of a measure of resilience among middle-adolescents in a South African setting. *Journal of Psychology in Africa*, 22(3), 405–408.

Mampane, M.R. (2014). Factors contributing to the resilience of middle-adolescents in a South African township: Insights from a resilience questionnaire. *South African Journal of Education*, 34(4), 1–11.

Mancini, A.D. & Bonanno, G.A. (2010). Resilience to potential trauma. In J.W. Reich, A.J. Zautra & J.S. Hall (eds). *Handbook of Adult Resilience*. New York, London: The Guilford Press, pp. 258–280.

Martin, L., Viljoen, M., Kidd, M. & Seedat, S. (2014). Are childhood trauma exposures predictive of anxiety sensitivity in school attending youth? *Journal of Affective Disorders*, 168, 5–12.

Masten, A.S. (2001). Ordinary magic: Resilience processes in development. *American Psychologist*, 56(3), 227.

Masten, A.S. (2007). Resilience in developing systems: Progress and promise as the fourth wave rises. *Development and Psychopathology*, 19(03), 921–930.

Masten, A.S., Burt, K.B., Roisman, G.I., Obradovic, J., Long, J.D. & Tellegen, A. (2004). Resources and resilience in the transition to adulthood: Continuity and change. *Development and Psychopathology*, 16(04), 1071–1094.

Masten, A.S. & O'Dougherty, W.M. (2009). Resilience over the lifespan developmental perspectives on resistance, recovery, and transformation. In J.W. Reich, A.J. Zautra & J.S. Hall (eds). *Handbook of Adult Resilience*. London: The Guilford Press, p. 213.

Mathews, S., Abrahams, N., Jewkes, R., Martin, L.J. & Lombard, C. (2012). *Child Homicide Patterns in South Africa: Is There a Link to Child Abuse*? Cape Town: Medical Research Council.

Mathibe, G.E. (2015). The relationship between perceived parenting styles, resilience and emotional intelligence among adolescents. Unpublished Master's thesis, Northwest University, Washington.

McCord, J. (1983). A forty-year perspective on effects of child abuse and neglect. *Child Abuse & Neglect, 7*(3), 265–270.

Meinck, F., Cluver, L.D., Boyes, M.E. & Mhlongo, E.L. (2015). Risk and protective factors for

physical and sexual abuse of children and adolescents in Africa: A review and implications for practice. *Trauma, Violence & Abuse*, 16(1), 81–107.

Messman-Moore, T.L. & Long, P.J. (2000). Child sexual abuse and revictimization in the form of adult sexual abuse, adult physical abuse, and adult psychological maltreatment. *Journal of Interpersonal Violence*, 15(5), 489–502.

Morojele, N.K. & Brook, J.S. (2006). Substance use and multiple victimisation among adolescents in South Africa. *Addictive Behaviors*, 31(7), 1163–1176.

Mrazek, P.J. & Mrazek, D.A. (1987). Resilience in child maltreatment victims: A conceptual exploration. *Child Abuse & Neglect*, 11(3), 357–366.

Mu, G.M. & Hu, Y. (2016). Validation of the Chinese version of the 12-Item Child and Youth Resilience Measure. *Children and Youth Services Review*, 70, 332–339.

Mullen, P.E., Martin, J.L., Anderson, J.C., Romans, S.E. & Herbison, G.P. (1996). The long-term impact of the physical, emotional, and sexual abuse of children: A community study. *Child Abuse & Neglect*, 20(1), 7–21.

Oladeji, B.D., Makanjuola, V.A. & Gureje, O. (2010). Family-related adverse childhood experiences as risk factors for psychiatric disorders in Nigeria. *The British Journal of Psychiatry*, 196(3), 186–191.

Oladipo, S.E. & Idemudia, E.S. (2015). Reliability and validity testing of Wagnild and Young's Resilience Scale in a sample of Nigerian Youth. *Journal of Psychology*, 6(1), 57–65. A*dolescence*, 26(1), 1–11.

Oshio, A., Kaneko, H., Nagamine, S. & Nakaya, M. (2003). Construct validity of the adolescent resilience scale. *Psychological Reports*, 93(3), 1217–1222.

Peltzer, K. & Pengpid, S. (2008). Sexual abuse, violence and HIV risk among adolescents in South Africa. *Gender and Behaviour*, 6(1), 1462–1478.

Prince-Embury, S. (2008). The resiliency scales for children and adolescents, psychological symptoms, and clinical status in adolescents. *Canadian Journal of School Psychology*, 23(1), 41–56.

Prince-Embury, S. & Courville, T. (2008). Measurement invariance of the Resiliency Scales for Children and Adolescents with respect to sex and age cohorts. *Canadian Journal of School Psychology*, 23(1), 26–40.

Rew, L., Taylor-Seehafer, M., Thomas, N.Y. & Yockey, R.D. (2001). Correlates of resilience in homeless adolescents. *Journal of Nursing Scholarship*, 33(1), 33–40.

Reza, A., Breiding, M.J., Gulaid, J., Mercy, J.A., Blanton, C., Mthethwa, Z., … Anderson, M. (2009). Sexual violence and its health consequences for female children in Swaziland: A cluster survey study. *The Lancet*, 373(9679), 1966–1972.

Rutter, M. (1987). Psychosocial resiliency and protective mechanisms. *American Journal of Orthopsychiatry*, 57, 316–329.

Rutter, M. (2000). Resilience reconsidered: Conceptual considerations, empirical findings, and policy implications. In J.P. Shonkoff & S.J. Meisels (eds). *Handbook of Early Childhood Intervention*, 2nd edn. New York: Cambridge University Press, pp. 651–682.

Ruvalcaba-Romero, N.A., Gallegos-Guajardo, J. & Villegas-Guinea, D. (2015). Validation of

the resilience scale for adolescents (READ) in Mexico. *Journal of Behavior, Health & Social Issues*, 6(2), 21–34.

Salifu Yendork, J. & Somhlaba, N.Z. (2015). Do social support, self-efficacy and resilience influence the experience of stress in Ghanaian orphans? An exploratory study. *Child Care in Practice*, 21(2), 140–159.

Sanders, J., Munford, R., Thimasarn-Anwar, T. & Liebenberg, L. (2015). Validation of the child and youth resilience measure (CYRM-28) on a sample of at-risk New Zealand youth. *Research on Social Work Practice*, 27(7), 827–840.

Seedat, M., Van Niekerk, A., Jewkes, R., Suffla, S. & Ratele, K. (2009). Violence and injuries in South Africa: Prioritising an agenda for prevention. *The Lancet*, 374(9694), 1011–1022.

Shehu, J. & Mokgwathi, M.M. (2008). Health locus of control and internal resilience factors among adolescents in Botswana: A case-control study with implications for physical education. *South African Journal for Research in Sport, Physical Education and Recreation*, 30(2), 95–105.

Sherr, L., Cluver, L.D., Betancourt, T.S., Kellerman, S.E., Richter, L.M. & Desmond, C. (2014). Evidence of impact: Health, psychological and social effects of adult HIV on children. *AIDS*, 28, 251–259.

Sherr, L., Croome, N., Castaneda, K.P. & Bradshaw, K. (2014). A systematic review of psychological functioning of children exposed to HIV: Using evidence to plan for tomorrow's HIV needs. *AIDS and Behavior*, 18(11), 2059–2074.

Sherr, L., Varrall, R., Mueller, J., Richter, L., Wakhweya, A., Adato, M., … Desmond, C. (2008). A systematic review on the meaning of the concept 'AIDS Orphan': Confusion over definitions and implications for care. *AIDS Care*, 20(5), 527–536.

Sidebotham, P. (2007). Fatal child maltreatment. In P. Sidebotham & P. Fleming (eds). *Unexpected Death in Childhood: A Handbook for Practitioners*. Chichester: John Wiley and Sons, pp. 75–93.

Skala, K. & Bruckner, T. (2014). Beating the odds: An approach to the topic of resilience in children and adolescents. *Neuropsychiatrie*, 28(4), 208–217.

Smith-Osborne, A. & Whitehill Bolton, K. (2013). Assessing resilience: A review of measures across the life course. *Journal of Evidence-based Social Work*, 10(2), 111–126.

Springer, K.W., Sheridan, J., Kuo, D. & Carnes, M. (2003). The long-term health outcomes of childhood abuse. *Journal of General Internal Medicine*, 18(10), 864–870.

Steyn, S.T. (2009). Resilience in adolescents: A psycho-educational perspective. Unpublished Master's thesis, University of South Africa, Pretoria.

Tignor, B. & Prince-Embury, S. (2013). Resilience in Kenyan youth living in the slums and suburbs of Nairobi: An exploratory and descriptive study. In S. Prince-Embury & D.H. Saklofske (eds). *Resilience in Children, Adolescents and Adults*. New York: Springer, pp. 257–278.

Ungar, M. (2011). The social ecology of resilience: Addressing contextual and cultural ambiguity of a nascent construct. *American Journal of Orthopsychiatry*, 81(1), 1–17.

Ungar, M. (2013). Resilience, trauma, context, and culture. *Trauma, Violence & Abuse*, 14(3),

255–266.

Ungar, M. (2015). Practitioner review: Diagnosing childhood resilience–a systemic approach to the diagnosis of adaptation in adverse social and physical ecologies. *Journal of Child Psychology and Psychiatry*, 56(1), 4–17.

Ungar, M., Brown, M., Liebenberg, L., Othman, R., Kwong, W., Armstrong, M. & Gilgun, J. (2008). Unique pathways to resilience across cultures. *Youth Studies Australia*, 27(2), 63–64.

Ungar, M. & Liebenberg, L. (2011). Assessing resilience across cultures using mixed methods: Construction of the child and youth resilience measure. *Journal of Mixed Methods Research*, 5(2), 126–149.

United Nations (UN). (2016). *Sustainable Development Goals*. Retrieved from: http://www.un.org/sustainabledevelopment/sustainable-development-goals/

Vaishnavi, S., Connor, K. & Davidson, J.R. (2007). An abbreviated version of the Connor-Davidson Resilience Scale (CD-RISC), the CD-RISC2: Psychometric properties and applications in psychopharmacological trials. *Psychiatry Research*, 152(2), 293–297.

Van Breda, A.D. (2016). The Youth Ecological-Resilience Scale: A partial validation. *Research on Social Work Practice*, 27(2), 248–250.

Van der Walt, L., Suliman, S., Martin, L., Lammers, K. & Seedat, S. (2014). Resilience and post-traumatic stress disorder in the acute aftermath of rape: A comparative analysis of adolescents versus adults. *Journal of Child & Adolescent Mental Health*, 26(3), 239–249.

Van Wyk, H. (2011). The relationship between vulnerability factors and life satisfaction in adolescents: A cross cultural study. Unpublished thesis, University of the Free State, Bloemfontein.

Vermeulen, T. & Greeff, A.P. (2015). Family resilience resources in coping with child sexual abuse in South Africa. *Journal of Child Sexual Abuse*, 24(5), 555–571.

Vindevogel, S., Wessells, M., De Schryver, M., Broekaert, E. & Derluyn, I. (2014). Dealing with the consequences of war: Resources of formerly recruited and non-recruited youth in northern Uganda. *Journal of Adolescent Health*, 55(1), 134–140.

Von Soest, T., Mossige, S., Stefansen, K. & Hjemdal, O. (2010). A validation study of the Resilience Scale for Adolescents (READ). *Journal of Psychopathology and Behavioral Assessment*, 32(2), 215–225.

Wagnild, G. & Young, H.M. (1993). Development and psychometric evaluation of the Resilience Scale. *Journal of Nursing Measurement*, 1(2), 165–178.

Wagnild, G.M. & Guinn, P.E. (2011). *The Resilience Scale User's Guide*. The US English version of the Resilience Scale and the 14-item Resilience Scale (RS-14). Worden, MT: Resilience Center.

Werner, E.E. (1994). *Overcoming the Odds: High-risk Children from Birth to Adulthood*. Ithaca, NY: Cornell University Press.

Windle, G., Bennett, K.M. & Noyes, J. (2011). A methodological review of resilience measurement scales. *Health and Quality of Life Outcomes*, 9(1), 8.

Wondie, Y., Zemene, W., Tafesse, B., Reschke, K & Schröder, H. (2011). The psychosocial consequences of child sexual abuse in Ethiopia: A case-control comparative analysis. *Journal of Interpersonal Violence*, 26(10), 2025–2041.

World Health Organisation (WHO). (2002). Child abuse and neglect by parents and other caregivers, Chapter 3. In *World Report on Violence and Health*. Retrieved from: http://www.who.int/violence_injury_prevention/violence/global_campaign/en/chap3.pdf

World Health Organisation (WHO). (2011). *Mental Health Atlas, 2011*. Retrieved from: http://apps.who.int/iris/bitstream/10665/44697/1/9799241564359_eng.pdf

Xiang, X., Tian, G., Wang, X. & Han, L. (2014). Validation of a Chinese version of the child and youth resilience measure among adolescents in Beijing. *China Youth & Children Research*, 5, 5–10.

Yendork, J.S. & Somhlaba, N.Z. (2016). The role of demographic and positive psychological factors on quality of life in Ghanaian orphans placed in orphanages: An exploratory study. *Child Indicators Research*, 9(2), 429–443.

Yu, X.-n., Lau, J.T., Mak, W.W., Zhang, J. & Lui, W.W. (2011). Factor structure and psychometric properties of the Connor-Davidson Resilience Scale among Chinese adolescents. *Comprehensive Psychiatry*, 52(2), 218–224.

Zand, B.K., Liebenberg, L. & Shamloo, Z.S. (2016). Validation of the factorial structure of the Child and Youth Resilience Measure for use with Iranian youth. *Child Indicators Research*, 1–13.

Zimmerman, M.A., Stoddard, S.A., Eisman, A.B., Caldwell, C.H., Aiyer, S.M. & Miller, A. (2013). Adolescent resilience: Promotive factors that inform prevention. *Child Development Perspectives, 7*(4), 215–220.

Chapter 14

The impact of epilepsy on behaviour and cognition in African children

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Introduction

Millions of children in sub-Saharan Africa are at risk of not achieving their developmental potential due to exposure to risk factors such as poverty, poor nutrition and ill-health.[1] A number of health conditions such as HIV, malaria and neurological disorders, such as epilepsy, interfere with optimal child development.[2] In this chapter, we discuss the neurobehavioural and cognitive consequences of epilepsy and highlight how these may hinder the achievement of the Sustainable Development Goals (SDGs) in Africa. Moreover, we examine how the SDGs may provide a framework within which intervention strategies can be implemented to address the needs of children with epilepsy and its associated comorbidities.

Epidemiology of childhood epilepsy in Africa

Epilepsy is more common in Africa than in most high-income countries.[3] Studies on prevalence in Africa are limited, but estimates of childhood prevalence range from 41/1 000 in rural Kenya[4] to 7.3/1 000 in South Africa.[5] The incidence of active epilepsy in childhood is estimated at 187/100 000 in malaria endemic areas,[6] but these results are not generalisable to other parts of Africa where risk factors for epilepsy may be quite different. Differences in rates are thought to be related to heterogeneity in risk factors,[7] cultural factors associated with perceptions and beliefs about epilepsy,[8]

1 Lu et al., 2016, pp. 916–922; Walker et al., 2007, pp. 145–157.
2 Abubakar et al., 2008, pp. 880–887; Kariuki et al., 2017, pp. 136–145; Kihara et al., 2006, pp. 386–397
3 Newton & Garcia, 2012, pp. 1193–1201.
4 Mung'ala-Odera et al., 2008, pp. 396–404.
5 Christianson et al., 2000, pp. 262–266.
6 Mung'ala-Odera et al., 2008, pp. 396–404.
7 Ngugi et al., 2013, pp. 253–263.
8 Kendall-Taylor et al., 2008, pp. 1638–1639.

and methodological differences, particularly related to definitions of epilepsy. For example, active epilepsy is defined in some studies as seizures in the past year, while other studies define it as seizures in the past five years.[9]

The most common risk factors for childhood epilepsy in Africa include family history of seizures, adverse perinatal events, central nervous system infections (e.g., cerebral malaria) and head injuries.[10] Current data may be outdated as they were collected more than a decade ago, and may not present a reliable picture of epilepsy in children. There have been changes, for example, in some risk factors—the widely recognised decline in *falciparum* malaria was associated with a reduction in the burden of acute seizures,[11] which is an important risk factor for epilepsy in sub-Saharan Africa.[12] Recently, the prevalence of epilepsy was estimated at 21/1 000 in children in Kenya, during a period when *falciparum* malaria declined.[13]

The epidemiology of childhood epilepsy in Africa, in terms of premature mortality, seizure remission following treatment and associated comorbidities is not fully understood. One of the reasons for this is that mortality is high in children of under five years in Africa and children often die before their epilepsy is identified and characterised. In addition, there are difficulties associated with defining epilepsy in young children in whom epilepsy can easily be confused with acute symptomatic seizures, and this is also a factor in why many epidemiology studies of epilepsy are of older children.[14]

Can epilepsy be comorbid with behavioural or emotional problems and neurocognitive impairments?

Childhood epilepsy is a serious neurological disorder with epileptic encephalopathies (West syndrome, Lennox-Gastaut syndrome and Dravet syndrome) presenting with unremitting seizures that result in serious brain damage beyond that which would be caused by the underlying aetiologies.[15] Adverse perinatal events are an important cause of epilepsy in children in Africa,[16] and electroencephalographic (EEG) features compatible with epileptic encephalopathy have been observed.[17] In sub-Saharan

9 Thurman et al., 2011, pp. 2–26.
10 Carter et al., 2004, pp. 978–981; Mung'ala-Odera et al., 2008, pp. 396–404; Ngugi et al., 2013, pp. 253–263.
11 Kariuki et al., 2011, pp. 1519–1528.
12 Bistervels et al., 2016, pp. 112–120.
13 Kind et al., 2017.
14 Mung'ala-Odera et al., 2008, pp. 396–404.
15 Neville, 2007.
16 Ngugi et al., 2013, pp. 253–263.
17 Kariuki et al., 2015.

Africa, symptomatic epilepsy is common and is associated with underlying neurological damage in the child. EEG studies have demonstrated focal epileptiform features that support underlying damage.[18] It is thought that the underlying genetic susceptibility associated with epilepsy may also be responsible for the behavioural and neurocognitive comorbidities of epilepsy in children. In addition, these impairments may be related to either the seizures themselves or the anti-epileptic drugs used to treat epilepsy. A bidirectional relationship is observed where behavioural problems may precede epilepsy, suggesting underlying brain damage as a cause of the seizures and comorbidities.[19] Additionally, it is possible that in a proportion of children with epilepsy, the comorbidities are coincidental and unrelated to the enduring genetic or neurological susceptibility to epileptic seizures,[20] as recently shown in Kenya.[21] The role of family processes and environmental factors in behavioural, emotional and neurocognitive comorbidity of childhood epilepsy are summarised in Figure 14.1.

Association between epilepsy and behavioural or emotional problems in Africa

An association between childhood epilepsy and behavioural and emotional problems has been reported in studies from North America,[22] Europe[23] and South America.[24] There are very few recent studies that have examined the relationship between epilepsy and behavioural and emotional outcomes in Africa; however a recent Kenyan study showed that mental health problems in epilepsy were well understood by the rural communities.[25] One study conducted in rural Kenya, involving 108 children with epilepsy, aged six to nine years, compared to 108 controls,[26] showed that behavioural problems occurred in 49 per cent of children with epilepsy compared to 26 per cent in those without epilepsy. Not only were behavioural problems more common in those with epilepsy than in those without epilepsy, the mean scores for behavioural problems were also greater in those with epilepsy compared to controls. These findings were replicated in a Nigerian study, which reported behavioural problems in 46 per cent of children with epilepsy, using the Rutter scales.[27] Another study in

18 Kariuki et al., 2015.
19 Rodenburg et al., 2005, pp. 453–468.
20 Gaitatzis, 2010, pp. 1325–1329.
21 Kariuki et al., 2017, pp. 136–145.
22 Hesdorffer et al., 2012, pp. 301–207.
23 Kariuki et al., 2016; Reilly et al., 2014, pp. 1586–1593.
24 Moreira et al., 2014, pp. 613–618.
25 Abubakar et al., 2015, pp. 74-78.
26 Kariuki et al., 2012, pp. 136–145.
27 Lagunju et al., 2012, pp. 214–218.

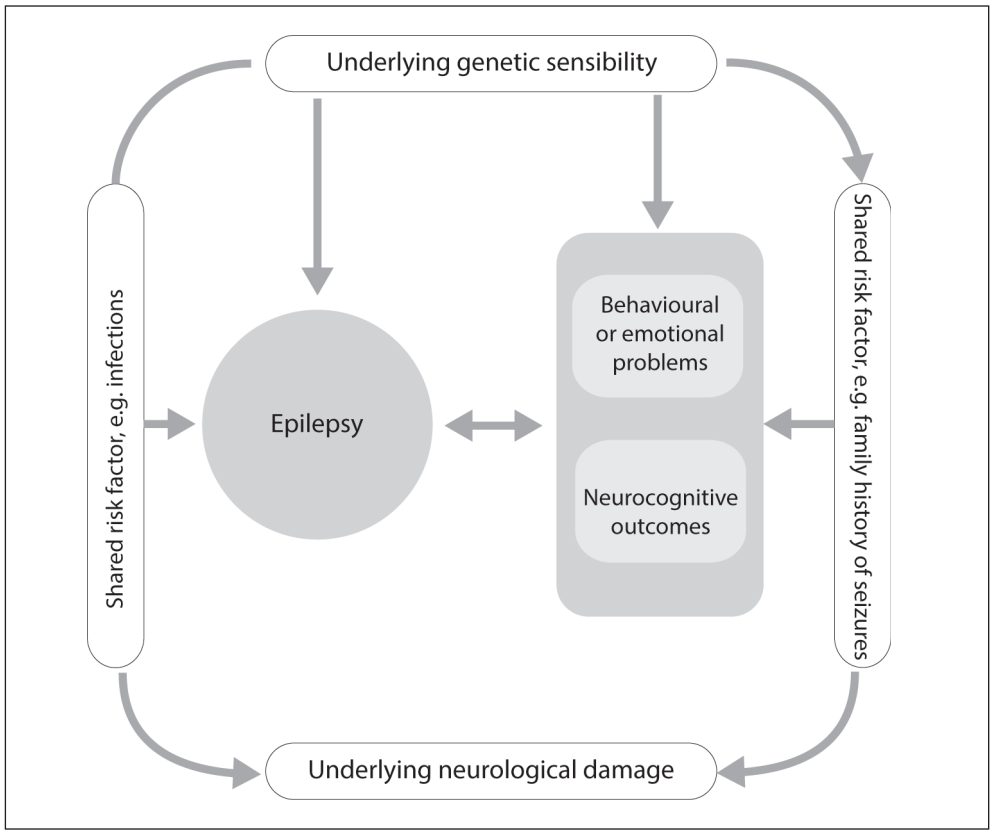

Figure 14. 1: Hypothesised relationship of factors associated with behavioural, emotional, and neurocognitive comorbidity of childhood epilepsy
Source: Developed by the authors

Tanzania reported behavioural and emotional problems in 66 per cent of children with epilepsy and in 19 per cent of controls.[28] A recent Kenyan study also found an association between epilepsy and autism spectrum disorders, and attention deficit hyperactivity disorder.[29]

The prevalence of behavioural problems appeared to be greater in the Tanzanian study than in the Kenyan and Nigerian studies. While the differences in prevalence may be due to incidence and prevalence of risk factors in each site, they may also be related to methodological differences. In particular, the Kenyan study used a locally developed behavioural assessment tool called the Child Behaviour Questionnaire for

28 Burton et al., 2011, pp. 1135–1142.
29 Kind et al, 2017.

Parents (CBQFP), while the Tanzanian study adopted Rutter's Behaviour Scale, in which there were some difficulties in the cultural adaptation process.

The association between epilepsy and neurocognitive outcomes in African children

There are fewer studies from Africa on neurocognitive problems following epilepsy than studies examining behavioural problems. This may be due to comorbidities not being routinely assessed in children presenting with epilepsy in African health facilities, or because of the lack of standardised neuropsychological tools. Cognitive impairments have been noted in 64 per cent of school-aged Tanzanian children,[30] 41 per cent of Nigerian children with epilepsy[31] and 31 per cent of Kenyan children.[32]

Risk factors for behavioural and emotional comorbidity in African children

Factors independently associated with poor behavioural and emotional outcomes in children with epilepsy include having active epilepsy and frequent seizures,[33] focal seizures and underlying neurocognitive impairment.[34] Active epilepsy is usually measured as having seizures in the last year, and so may represent those with frequent seizures compared to those with inactive epilepsy, which is likely related to poorly treated seizures.[35] Intractable epilepsy has been associated with more behavioural problems than epilepsy responding to anti-epileptic drugs.[36] Cognitive impairment may be a marker of underlying neurological damage that is related to the epilepsy or that independently contributes to poor behavioural outcomes.

Risk factors of behavioural comorbidity in epilepsy are more common in Africa than in high-income countries where family and psychosocial risk factors are predominant.[37] This may be explained by the better treatment of epilepsy in high-income countries.[38] While treatment of epilepsy in children would be expected to reduce behavioural and emotional comorbidities, it is thought that some

30 Burton et al., 2012, pp. 169–174.
31 Familusi, 1985, pp. 10–14.
32 Kariuki et al., 2012, pp. 136–145.
33 Burton et al., 2011, pp. 1135–1142; Kariuki et al., 2012, pp. 136–145.
34 Kariuki et al., 2012, pp. 136–145; Lagunju et al., 2012, pp. 214–218; Molteno et al., 2001, pp. 515–520.
35 Kariuki et al., 2014, pp. 76–85.
36 Familusi, 1985, pp. 10–14.
37 Reilly et al., 2014, pp. 1586–1593.
38 Kariuki et al., 2014, pp. 76–85.

anti-epileptic drugs, such as phenobarbital, actually increase behavioural problems.[39] Recently, a number of new risk factors have been identified. Geophagia (the habit of eating clay or soil) has been associated with behavioural and emotional problems and may cause brain damage, perhaps through heavy metal exposure from the soil or as a consequence of intellectual disability.[40] Consumption of cassava has been associated with behavioural and emotional problems in children[41] and with epilepsy in adults,[42] but this may be because those who typically eat cassava are socio-economically deprived and are also at increased risk for mental and neurological conditions.[43]

Childhood epilepsy in the context of the SDGs

SDG 1 aims to end all forms of poverty everywhere to ensure a child's right to a sustainable standard of living with regard to physical, mental, spiritual, moral and social development. Children living with epilepsy are more likely to live in a home with lower socio-economic status, which hinders the realisation of this important goal. Social disadvantage may modify the impact of epilepsy and associated neurobehavioural comorbidities on a child's neurodevelopment, consequently limiting the opportunities for these children.[44] In addition, parents of children with epilepsy and associated neurobehavioural comorbidities may be stigmatised, prompting these parents to invest less in the education of their affected children than they would with their healthy siblings. This situation is thought to be related to low expectations held by the parents of children with epilepsy or the parents' lack of awareness about the impact of epilepsy and its comorbidities on the development potential of their children.

Article 24.3 of SDG 3 states that partners should aim to abolish traditional practices prejudicial to the health of children. For children with epilepsy, this is extremely important since their parents' or community's traditional beliefs and practices can often contribute to delay in accessing biomedical management of their condition, resulting in a larger treatment gap for epilepsy in children than in adults.[45] Poor management of epilepsy results in more comorbidities and consequently poorer quality of life outcomes, including impaired development potential. For instance, there is evidence that people in local communities associate epileptic seizures with

39 Banu et al., 2007, p. 1207.
40 Kariuki, et al., 2017, pp. 136–145.
41 Kariuki et al., 2017, pp. 136–145.
42 Ngugi et al., 2013, pp. 253–263.
43 Heaney et al., 2002, pp. 1013–1016.
44 Abubakar et al., 613–621.
45 Ibinda et al., 2017.

spirit possession, being cursed by a family member or having broken a taboo.[46] This has also been associated with the preference for visiting traditional healers and the use of unorthodox methods of seizure control, e.g., pouring water and inserting objects, such as spoons, into the child's mouth.

The disabilities and impairments associated with epilepsy lead to functional impairments, lowered educational achievement and long-term detrimental social outcomes, e.g., the lack of employment in adulthood.[47] These impairments hinder the achievement of the SDGs, especially those associated with SDG 4, which aims for inclusive and equitable quality education and the promotion of lifelong learning. Although the data are lacking in many African countries, children with epilepsy are less likely to attend school and those who attend are less likely to complete school; even when children with epilepsy do complete their schooling, they are more likely to have poor outcomes.[48] These poor educational outcomes may be associated with factors such as direct damage from frequent seizures, neurotoxicity and the side effects of the anti-epileptic drugs, and consequent behavioural and cognitive impairment, as previously discussed. Early identification of risk factors of childhood epilepsy for the prevention or prompt and immediate treatment of epilepsy with anti-epileptic drugs would reduce comorbidities of severe epilepsy in children and lead to better outcomes.

The last SDG, SDG 17, successfully summarises how the needs of children with epilepsy should be met. In this goal, it is stated that there is a need to strengthen the means for implementation and utilise global partnerships for sustainable development. This means working together with partners to set educational interventions and rehabilitation services for improving management of the needs of children with epilepsy in Africa. For children with epilepsy, there is a need to mobilise resources to close the treatment gap. The resources currently provided by most governments are insufficient to close the treatment gap in Africa. This has been associated with inadequate skilled staffing, the cost of treatment, the unavailability of drugs and culture-specific beliefs. Building government and private sector partnerships, as proposed by SDG 17.17, would effectively mobilise resources for providing treatment for children with epilepsy. In Kenya, an example is the National Epilepsy Coordination Committee (http://epilepsykenya.org/), which brings together various stakeholders with the common goal of improving care for people with epilepsy, including children. While these partnerships experience myriad challenges, particularly a shortage of funds to implement their objectives, such organisations should work together with those of comorbidities of epilepsy (e.g., autism and attention deficit hyperactivity

46 Kendall-Taylor et al., 2008, pp. 1638–1639.
47 Anita et al., 2016, p. 2; Ibinga et al., 2015, pp. 110–116.
48 Ibinga et al., 2015, pp. 110–116.

disorders) to ensure comprehensive planning for the management of children with epilepsy.

References

Abubakar, A., Kariuki, S.M., Tumaini, J.D., Gona, J., Katana, K., Owen, J.A. & Newton, C.R. (2015). Community perceptions of developmental and behavioral problems experienced by children living with epilepsy on the Kenyan coast: A qualitative study. *Epilepsy Behaviour*, 45, 74–78.

Abubakar, A., Van Baar, A., Van de Vijver, F.J., Holding, P. & Newton, C.R. (2008). Paediatric HIV and neurodevelopment in sub-Saharan Africa: A systematic review. *Tropical Medicine & International Health*, 13(7), 880–887.

Abubakar, A., Van de Vijver, F., Van Baar, A., Mbonani, L., Kalu, R., Newton, C. & Holding, P. (2008). Socioeconomic status, anthropometric status, and psychomotor development of Kenyan children from resource-limited settings: A path-analytic study. *Early Human Development*, 84(9), 613–621.

Anita, M., Mona, P. & Maninde, S. (2016). Neurobehavioral comorbidities in children with epilepsy. *Journal of Neurology and Neurophysiology*, 7(371), 2.

Banu, S. H., Jahan, M., Koli, U.K., Ferdousi, S., Khan, N.Z. & Neville, B. (2007). Side effects of phenobarbital and carbamazepine in childhood epilepsy: Randomised controlled trial. *British Medical Journal*, 334(7605), 1207.

Bistervels, I.M., Kariuki, S.M. & Newton, C.R.J.C. (2016). Risk of convulsive epilepsy following acute seizures in Kenyan children. *Epilepsia Open*, 1(3–4), 112–120.

Burton, K., Rogathe, J., Hunter, E., Burton, M., Swai, M., Todd, J.I.M., … Newton, C. (2011). Behavioural comorbidity in Tanzanian children with epilepsy: A community-based case–control study. *Developmental Medicine and Child Neurology,* 53(12), 1135–1142.

Burton, K., Rogathe, J., Whittaker, R.G., Mankad, K., Hunter, E., Burton, M.J., … Newton, C. R. (2012). Co-morbidity of epilepsy in Tanzanian children: A community-based case-control study. *Seizure,* 21(3), 169–174.

Burton, K.J., Rogathe, J., Whittaker, R., Mankad, K., Hunter, E., Burton, M.J., … Newton, C.R. (2012). Epilepsy in Tanzanian children: Association with perinatal events and other risk factors. *Epilepsia*, 53(4), 752–760.

Carter, J.A., Neville, B.G.R., White, S., Ross, A.J., Otieno, G., Mturi, N., … Newton, C.R. (2004). Increased prevalence of epilepsy associated with severe *falciparum* malaria in children. *Epilepsia*, 45(8), 978–981.

Christianson, A.L., Zwane, M.E., Manga, P., Rosen, E., Venter, A. & Kromberg, J.G. (2000). Epilepsy in rural South African children: Prevalence, associated disability and management. *South African Medical Journal*, 90(3), 262–266.

Familusi, J.B. (1985). Preliminary Nigerian experience in the use of carbamazepine in children with intractable seizures. *Epilepsia*, 26(1), 10–14.

Gaitatzis, A. (2010). The comorbidity of epilepsy: Epidemiology, mechanisms and consequences. In C.P. Panayiotopoulos (ed.). *Atlas of Epilepsies*. London: Springer, pp. 1325–1329.

Heaney, D.C., MacDonald, BK., Everitt, A., Stevenson, S., Leonardi, G. S., Wilkinson, P. & Sander, J.W. (2002). Socioeconomic variation in incidence of epilepsy: Prospective community based study in south east England. *British Medical Journal*, 325(7371), 1013–1016.

Hesdorffer, D.C., Caplan, R. & Berg, A.T. (2012). Familial clustering of epilepsy and behavioral disorders: Evidence for a shared genetic basis. *Epilepsia*, 53(2), 301–307.

Ibinda, F., Odermatt, P., Kariuki, S.M., Kakooza-Mwesige, A., Wagner, R.G., Owusu-Agyei, S., … Doku, V.C. (2017). Magnitude and factors associated with nonadherence to antiepileptic drug treatment in Africa: A cross-sectional multisite study. *Epilepsia Open*, 2(2), 226–235.

Ibinga, E., Ngoungou, E.B., Olliac, B., Hounsossou, C.H., Dalmay, F., Mouangue, G., … Druet-Cabanac, M. (2015). Impact of epilepsy on children and parents in Gabon. *Epilepsy & Behavior*, 44, 110–116.

Kariuki, S.M., Abubakar, A., Holding, P.A., Mung'ala-Odera, V., Chengo, E., Kihara, M., … Newton, C.R. (2012). Behavioral problems in children with epilepsy in rural Kenya. *Epilepsy & Behavior, 23*(1), 41–46.

Kariuki, S.M., Abubakar, A., Kombe, M., Kazungu, M., Odhiambo, R., Stein, A. & Newton, C.R. (2017). Burden, risk factors, and comorbidities of behavioural and emotional problems in Kenyan children: A population-based study. *Lancet Psychiatry, 4*(2), 136–145.

Kariuki, S.M., Ikumi, M., Ojal, J., Sadarangani, M., Idro, R., Olotu, A., … Newton, C.R. (2011). Acute seizures attributable to falciparum malaria in an endemic area on the Kenyan coast. *Brain*, 134(5), 1519–1528.

Kariuki, S.M., Matuja, W., Akpalu, A., Kakooza-Mwesige, A., Chabi, M., Wagner, R.G., … Noh, J. (2014). Clinical features, proximate causes, and consequences of active convulsive epilepsy in Africa. *Epilepsia*, 55(1), 76–85.

Kariuki, S.M., Newton, C.R., Prince, M.J. & Das-Munshi, J. (2016). The association between childhood seizures and later childhood emotional and behavioral problems: Findings from a nationally representative birth cohort. *Psychosomatic Medicine*, 78(5), 620–628.

Kariuki, S.M., White, S., Chengo, E., Wagner, R.G., Ae-Ngibise, K.A., Kakooza-Mwesige, A., … Newton, C.R. (2015). Electroencephalographic features of convulsive epilepsy in Africa: A multicentre study of prevalence, pattern and associated factors. *Clinical Neurophysiology*, 127(2), 1099–1107.

Kendall-Taylor, N., Kathomi, C., Rimba, K. & Newton, C.R. (2008). Traditional healers and epilepsy treatment on the Kenyan coast. *Epilepsia*, 49(9), 1638–1639.

Kihara, M., Carter, J.A. & Newton, C.R. (2006). The effect of *Plasmodium falciparum* on cognition: A systematic review. *Tropical Medicine & International Health*, 11(4), 386–397.

Kind, C.J., Newton, C.R., Kariuki, S.M. & the Neurodevelopment Disorders Study Group. (2017). Prevalence, risk factors and neurobehavioral comorbidities of epilepsy in Kenyan children. *Epilepsia Open*, 2(4), 388–399.

Lagunju, I.A., Bella-Awusah, T.T., Takon, I. & Omigbodun, O.O. (2012). Mental health problems in Nigerian children with epilepsy: Associations and risk factors. *Epilepsy & Behavior*, 25(2), 214–218.

Lu, C., Black, M.M. & Richter, L.M. (2016). Risk of poor development in young children in low-income and middle-income countries: An estimation and analysis at the global, regional, and country level. *The Lancet Global Health*, 4(12), e916–e922.

Molteno, G., Molteno, C.D., Finchilescu, G. & Dawes, A.R.L. (2001). Behavioural and emotional problems in children with intellectual disability attending special schools in Cape Town, South Africa. *Journal of Intellectual Disability Research*, 45(6), 515–520.

Moreira, F.D., Lima, A.B.D., Fonseca, P.C. & Maia Filho, H.D.S. (2014). Mental health of children and adolescents with epilepsy: Analysis of clinical and neuropsychological aspects. *Arquivos de Neuro-Psiquiatria*, 72, 613–618.

Mung'ala-Odera, V., White, S., Meehan, R., Otieno, G.O., Njuguna, P., Mturi, N., … Newton, C.J.R.C. (2008). Prevalence, incidence and risk factors of epilepsy in older children in rural Kenya. *Seizure*, 17, 396–404.

Neville, B. (2007). Epileptic encephalopathy. *Annals of Indian Academy of Neurology,* 10(5), 3-6.

Newton, C.R. & Garcia, H.H. (2012). Epilepsy in poor regions of the world. *The Lancet*, 380(9848), 1193–1201.

Ngugi, A.K., Bottomley, C., Kleinschmidt, I., Wagner, R.G., Kakooza-Mwesige, A., Ae-Ngibise, K., … Newton, C.R. (2013). Prevalence of active convulsive epilepsy in sub-Saharan Africa and associated risk factors: Cross-sectional and case-control studies. *The Lancet Neurology,* 12(3), 253–263.

Reilly, C., Atkinson, P., Das, K.B., Chin, R.F., Aylett, S.E., Burch, V., … Neville, B.G. (2014). Neurobehavioral comorbidities in children with active epilepsy: A population-based study. *Pediatrics, 133*(6), e1586–1593.

Rodenburg, R., Stams, G.J., Meijer, A.M., Aldenkamp, A.P. & Deković, M. (2005). Psychopathology in children with epilepsy: A meta-analysis. *Journal of Pediatric Psychology,* 30(6), 453–468.

Thurman, D.J., Beghi, E., Begley, C.E., Berg, A.T., Buchhalter, J.R., Ding, D., … Wiebe, S. (2011). Standards for epidemiologic studies and surveillance of epilepsy. *Epilepsia*, 52, 2–26.

Walker, S.P., Wachs, T.D., Gardner, J.M., Lozoff, B., Wasserman, G.A., Pollitt, E., … Group, I.C.D.S. (2007). Child development: Risk factors for adverse outcomes in developing countries. *The Lancet*, 369(9556), 145–157.

Conclusion

Child and adolescent development in Africa: Future research

Anne C. Petersen, Mambwe Kasese-Hara & Esther Akinsola

Introduction

This volume is important in so many ways, but particularly because it fills some of the gaps in the literature on child health and development in Africa. In all health research, children have been neglected,[1] despite the fact that they represent the future of any nation. Making adults healthy is, at best, a highly short-term approach; if children reach adulthood with significant limitations, they cannot become the productive adults they would otherwise be. As the introduction to this volume makes clear, children are especially important on the continent of Africa because they represent a rapidly increasing proportion of the population.

The focus on African child health and development in this book helps to redress the overemphasis on HIV/AIDS priorities in Africa relative to healthy development and other health priorities.[2] Dealing with the HIV/AIDS crisis necessarily began with understanding and slowing the epidemic, which required attention to child survival following mother-to-infant transmission of HIV. Treatment and prevention efforts, and particularly prevention of mother-to-child transmission (PMTCT), have largely succeeded. With HIV, it is important to continue to build rigorous research on children who have dealt with parental loss due to AIDS[3] and on reducing the risk of adolescent acquisition of HIV.[4]

This volume joins other recent efforts[5] to gather research on healthy development among children and adolescents in sub-Saharan Africa. It addresses many important topics such as mental health and resilience, as well as the important issues of measurement and interventions. At the same time, it is beyond the scope of this volume to capture

1 Britto et al., 2012.
2 Institute of Medicine, 2013.
3 Nyayamukapa et al., 2008, pp. 133–141.
4 Abubakar, 2014, pp. 23–41; Cluver & Gardner, 2007, pp. 1–17; Muhati-Nyakundi et al., 2017, pp. 160–170; Slemming & Saloojee, 2013, pp. 50–55.
5 Serpell & Marfo, 2009.

the breadth and depth of current child development research in Africa in its entirety.[6] Attention to behavioural, structural and sociocultural issues is particularly important for understanding programmes and what makes them successful.[7] As Stevenson et al. note in the introduction to this book, the Sustainable Development Goals provide an excellent opportunity for increasing focus on adolescence. While no single volume could possibly achieve all of what is desired, this book represents an excellent contribution to research on African child and adolescent health and development.

Opportunities for the study of child/adolescent development in sub-Saharan Africa

Economic growth opportunities for research

Except for a decline in 2015 and 2016, economic growth in sub-Saharan Africa has been strong for the past couple of decades with recent reports from the International Monetary Fund (2017) and the World Bank (2017) predicting resumed growth.[8] Consistent growth in most countries has led to increased interest in sub-Saharan Africa by business and industry as well as by multinational governmental and non-governmental organisations. However, government spending on research and development in sub-Saharan Africa has lagged behind other economic indicators.[9]

Increased economic growth provides an opportunity for nations to invest in universities and research as a way of stimulating additional growth in innovation and business startups.[10] However, this requires political will. Both China and Brazil have made significant investments of this kind; some African countries—such as Ethiopia and Kenya among others—are doing so as well. The Association of African Universities (AAU) is partnering with the World Bank to build African Centres of Excellence in Science and Technology in higher education.[11] While the initial fields included represent a small set (agriculture, engineering, health, mining, science and technology), the approach is promising and one to be expanded in the future.

Scientific productivity in Africa

A recent study of trends in scientific productivity and its impact[12] finds that almost all countries have increased in both indicators, including African nations. Notably, all

6 Marfo, 2011, pp. 140–147; Pence & Nsamenang, 2008; Serpell & Marfo, 2009; Tchombe et al., 2013.
7 Ndebele et al., 2012, pp. 37–47.
8 International Monetary Fund (IMF), 2017; World Bank, 2017b.
9 Petersen, 2012.
10 Diop, 2014.
11 World Bank, 2017a.
12 Wagner & Jonkers, 2017.

growth in publication productivity is due to international co-authorship, emphasising the importance of international collaboration. A study by Wagner and Jonkers indicates that, with the notable exception of the United States, national productivity is highly correlated with openness to international collaborations. The study shows that in the United States researchers tend to 'extract' data from other nations rather than collaborating, thereby missing chances to build research capacity. While this approach may be more efficient, the benefits of collaboration are enormous, with significant learning to be gained by all researchers, whether they are from high-income countries or Africa. Importantly, the authors of this volume are mostly African researchers (although European names dominate). Sustainable African research requires strong research capacity among African researchers.[13]

Child development investments

Current efforts in Africa, like the Centres of Excellence project mentioned earlier, focus primarily on fields with the greatest economic return to business and industry. There are currently a few research centres in Africa that focus on child development, such as the Aga Khan Institute for Human Development in Kenya.[14] South Africa is especially rich in developmental research and institutions focused on child development, exemplified by the Birth to Twenty Plus (Bt20+) study, Africa's largest and longest running study of child and adolescent health and development;[15] the Children's Institute;[16] the Centre for Early Childhood in South Africa;[17] and Prevention Research for Community, Family and Child Health.[18] South Africa is at a greater advantage in the sub-Saharan region in terms of the number and ratings of institutions of higher learning.[19]

Children, and especially youth, represent the largest demographic group in sub-Saharan Africa.[20] This means that investment, especially in the first two decades of life, would have tremendous impact on the future economic growth and well-being of African nations. Conversely, failure to educate and create pathways to work for adolescents will have dire consequences for nations. Youth always have higher unemployment rates than adults (typically at least double the adult rate), an effect exacerbated during global economic downturns or recessions.[21] Further, recent

13 We also note that there is now a website, African Journals Online (http://www.ajol.info/), that tracks articles published in African journals in all disciplines.
14 https://www.aku.edu/ihd/Pages/home.aspx
15 Richter et al., 2012, pp. 621–626.
16 http://www.ci.uct.ac.za/
17 http://www.cecd.org.za/
18 http://www.preventionresearch.org.za
19 *Times Higher Education*, 2016.
20 Petersen et al., 2016, pp. 289–320; Verma & Petersen, 2015, pp. 355–376.
21 Ortiz & Cummins, 2012.

efforts to enhance child survival and improve child health have created a 'youth bulge' and left out adolescents—expenditures have shifted from adolescence to early childhood efforts called for by the Millennium Development Goals (MDGs). Instead, nations should be considering adolescents and youth as a demographic opportunity.[22] Providing youth with opportunities to improve their futures and those of their families, communities and nations can be a tremendous economic engine for countries.

Finally, there is evidence that great benefit is derived from engaging the intended beneficiaries of research and programmes in their design and implementation.[23] Partnering with communities also requires attention to culture.[24] In relation to this volume, it is most important to engage children in the process of the research that is intended to benefit them. While young people may not fully understand the research design and underlying theories, they are likely to be curious about what is intended and can make contributions. This approach has been used effectively for decades in US agricultural extension research and is now expanding to other areas.[25] This engagement could result in further benefit to child development, perhaps even stimulating interest in school, science and research more broadly.

Important research perspectives to use in Africa

We understand the tendency for research to follow research funding. Health research in Africa has been dominated by HIV/AIDS because of the relative abundance of funding. But many observers, and sometimes nations, have noted the greater importance of other health and life issues. For example, the United Nations Children's Fund (UNICEF) has turned its attention to non-communicable diseases (NCD) as they result in even greater morbidity and mortality[26] than HIV. These NCDs include mental health as a priority area.[27]

Developmental science

Developmental science has advanced enormously over the past decades, achieving greater understanding of developmental processes, and identifying rigorous prevention approaches to keep children and adolescents healthier. Developmental models are inevitably systems models. The classic Bronfenbrenner ecological theory for

22 Diers, 2013, pp. 214–222.
23 Catalano et al., 2012, pp. 1653–1664; Koller et al., 2017.
24 Airhihenbuwa et al., 2013; Iwelunmor et al., 2013.
25 Krasny & Doyle, 2002.
26 UNICEF, 2015.
27 Patel et al., 2007, pp.1302–1313.

development,[28] for example, is a systems model in which the developing individual is embedded in a set of social systems, all of which interact with the individual in complex transactions. We have moved beyond stage theories for development to understanding the importance of environment and contexts,[29] and examining environmental transactions at every level.[30] Research tests hypotheses about developmental processes using all available methods—both qualitative and quantitative measures at the biological, psychological, cognitive and social levels, as well as probabilistic statistics and rigorous research designs.[31] Rather than assuming that there is a 'normal' process for development, as stage theories did, current developmental research has found that 'continuity is an epiphenomenon of stable organism–environment relationships'.[32] The concept of developmental cascades also represents an advance, and refers to the idea that functioning in one domain or at one level of adaptation can spread to influence other domains or levels of adaptive function.[33]

Diversity of methods and multidisciplinary perspectives are also key to developmental science. Given that developmental science is a systems science, all the subsystems—from cell biology to macro social systems and culture—are inherently involved, requiring both quantitative and qualitative methods. While longitudinal designs and analyses are essential to documenting change, experiments also play a key role in understanding causal factors. A few decades ago, the developmental science of adolescence began integrating biology and behaviour as complementary rather than competing perspectives.[34] Advances in prevention science have played a significant role in advancing developmental science by intervening with developmental processes to improve outcomes.[35] Natural experiments have proved valuable in increasing our understanding of developmental processes, a research design probably best explored in Rutter's work.[36] Research comparing cultural cases can be useful for hypothesis generation about the sources of variation in development.[37]

Resilience research

Another research perspective important for work in Africa is that of resilience, the capacity to have better-than-expected outcomes in the context of challenges or risks

28 Bronfenbrenner, 1979.
29 Bronfenbrenner, 2005; Rutter, 2013; Sameroff, 2010, pp. 6–22; Sameroff, 2012, pp. 37–39.
30 Sameroff, 2012, pp. 37–39.
31 Rutter et al., 2006, pp. 1009–1018; Sameroff, 2010, pp. 6–22.
32 Sameroff, 2012, pp. 37–39.
33 Masten & Cicchetti, 2012, pp. 333–334.
34 Petersen & Taylor, 1980, pp. 117–155.
35 Catalano, 2007, pp. 377–398; Catalano et al., 2010, pp. 92–96.
36 Rutter, 2002, pp. 1–21; Rutter, 2013.
37 Arnett, 2008, pp. 602–614; Nsamenang, 1992.

in development.[38] Rutter (earlier together with Garmezy) is credited with much of the conceptual work in this field.[39] He now defines resilience as:

> reduced vulnerability to environmental risk experiences, the overcoming of a stress or adversity, or a relatively good outcome despite risk experiences. Thus it is an *interactive* concept in which the presence of resilience has to be *inferred* from individual variations in outcome among individuals who have experienced significant major stress or adversity.[40]

Much of the resilience research is published under the framework of developmental psychopathology, or stress processes more generally. Newer research within this framework is exploring the interplay among adversity, physiological sensitivity to context and adaptive functioning.[41] For some time we have known that not all children have the same reactions to similar contexts or adverse experiences. Both animal and human research is beginning to clarify the role of epigenetic processes in producing these different responses to highly stressful environmental circumstances, such as child abuse and neglect. Initially, Meaney et al.[42] discovered the role of epigenesis in 'getting under the skin'. This research has implications for child development research, programmes and policy.[43]

Neuroscience has transformed developmental science by specifying an important pathway for behavioural outcomes. One powerful example is with child maltreatment research, which documents how early abuse affects the developing brain and related behavioural and life outcomes.[44] Similarly, cultural neuroscience is identifying the neural processes that represent how culture affects behaviour—'embrained culture'.[45] Repeated behaviour, as culture requires, influences brain processing with the involvement of genes such as the dopamine receptor gene.

Prevention research

A third area of exciting research advances over the past decade is that of prevention research.[46] The first wave of prevention research, carried out largely in high-income countries, was not successful.[47] The second wave was targeted on specific behaviours; the interventions were proven effective but were criticised for not addressing the

38 Masten & Tellegen, 2012, pp. 345–351.
39 Rutter, 2012, pp. 335–344.
40 Rutter, 1987, pp. 316–331; 2012, pp. 335–344.
41 Obradović, 2012, pp. 371–387.
42 Meaney et al., 2007, pp. 269–277.
43 Meaney, 2010, pp. 41–79.
44 National Research Council, 2014; Pollak et al., 2010, pp. 224–236.
45 Kitayama et al., 2017; Kitayama & Uskul, 2011, pp. 419–449.
46 Catalano, 2007, pp. 377–398; Catalano et al., 2010, pp. 92–96; Catalano et al., 2012, pp. 1653–1664.
47 Catalano et al., 2012, pp. 1653–1664.

underlying risk and protective factors involved in development. The next generation of preventive interventions (including health promotion) were tested with controlled trials and were highly effective in reducing adolescent problem behaviour that leads to most of adult morbidity and mortality, especially in non-communicable diseases.[48] Intervention research has demonstrated that effective preventive interventions can be designed and implemented that will stop even adverse outcomes such as child abuse; additionally, new treatment interventions have been found to moderate, and even reverse, some destructive developmental processes set in motion earlier in life.[49]

In most low- and middle-income countries (LMICs), treatment is still the dominant mode of intervention.[50] Prevention research is more appropriate in adolescence than childhood, and adolescence has emerged only recently as a recognised age group in the LMICs. Therefore, prevention research does not have a long history in the LMICs. Nonetheless, research in these countries has recently begun testing preventive models. Because prevention research integrates life-course development and community epidemiology, it is readily accepted in many countries and communities in the LMICs.[51] The major review of prevention research in *The Lancet* Special Issue[52] identified 25 programmes with evidence of efficacy, eight of them addressing structural risks (e.g., policies and access to care), eight programmes addressing family and individual risks (e.g., low-income and vulnerable families), four programmes addressing school and individual risks (e.g., mostly cash transfers), and five programmes that address peer and individual risks (e.g., life skills). While most of the programmes were studied in high-income countries, three have been tested in Africa. Nonetheless, much research is needed to be assured that the effective programmes can be used in LMICs and in sub-Saharan Africa.

Positive youth development

A fourth area of recent research that has gained recognition globally is that of positive youth development.[53] The construct emerged in the late 1990s, driven in part by recognition that interventions to treat problems (especially externalising behaviours) were not motivating to young people or their families, often yielding null or even negative results.[54] As previously discussed, prevention is more effective, and the promotion of positive outcomes even more so.[55]

48 Catalano et al., 2012, pp. 1653–1664.
49 National Research Council, 2014.
50 Patel et al., 2007, pp. 991–1005.
51 Catalano et al., 2012, pp. 1653–1664.
52 Catalano et al., 2012, pp. 1653–1664.
53 Petersen, 2017; Smith et al., 2017, pp. 1035–1397.
54 Catalano, 2007, pp. 377–398.
55 Catalano et al., 2012, pp. 1653–1664.

Challenges for the study of child/adolescent development in sub-Saharan Africa

Concurrent with our finding of much promising research on child and adolescent development and health from Africa, and especially sub-Saharan Africa, we also recognise the serious limitations that confront researchers in Africa. Among the greatest of these is limited research infrastructure, including the research workforce; these conclusions are especially serious in the field of child and adolescent development and health.[56]

UNICEF and other UN agencies have been working to identify and address some of these needs,[57] often working in partnership with foundations and other non-governmental organisations to address research knowledge, along with capacity building. To level out the unequal terrain, research exchange programmes between countries in the region, which focus on the strengths and contributions of each participating country, are to be encouraged. Despite the existence of funders supporting South-to-South collaborations, more opportunities are needed where nations participate in joint developmental research programmes with the ultimate aim of facilitating developments in individual countries; this may include offering incentives for fellows to return to their home countries to contribute meaningfully to similar programmes.

The current emphasis of multinational government organisations on scale, typically implemented top-down, is advantageous in the support with funding and the authority that accompanies it. At the same time, what is lost is bottom-up passion and ownership. The latter is often key for sustainability. More seriously, top-down efforts that come from multinationals may not be culturally sensitive to local values, thus undermining attempts to provide benefit. The prevention interventions described previously require community engagement and may be more attractive to communities and nations in sub-Saharan Africa. We recommend a more diversified approach to efforts in Africa to build sustainable capacity from all quarters.

Priorities and strategies to advance research on child and adolescent development

We believe that priorities and approaches are best when developed and implemented by the intended beneficiaries. Based on existing research, several topics seem important to propose for future research on children and adolescents in sub-Saharan Africa: mental health, social contexts supporting positive development, and better

56 Catalano et al., 2012, pp. 1653–1664; Patel et al., 2007, pp. 1302–1313.
57 Diers, 2013, pp. 214–222.

understanding of the risk and protective factors in African families and the related biological processes.

Community-based prevention and promotion trials hold great promise for children and families in sub-Saharan Africa.[58] Further, policy research is a new frontier for both high- and low-income countries and much would be learnt from the examination of policy implementation in sub-Saharan Africa.[59]

As noted earlier, attention should be paid to theories, constructs and measures from African researchers that are appropriate to their culture and context. For example, the growth of developmental research and research-based interventions in South Africa has benefited tremendously from the critical discourses that emerged at the dawn of the post-apartheid state, focused on freeing the social sciences from apartheid legacies and developing more relevant approaches.[60] The Bt20+ study and other examples given previously reflect a reconfigured direction for the development of South Africa's populations.

The growth of community psychology during this era has contributed to a more relevant developmental approach through its acknowledgement of the sociocultural, socio-economic, political and historical events that influence communities in South Africa.[61] The community-focused approach also emphasises a participatory paradigm in which the individual is seen as an active participant rather than a passive recipient of his/her circumstances. Without these deliberate internal initiatives, African countries will continue to resign themselves to an uninterrogated public health approach[62] that leans more towards the top-down approach, in which developmental initiatives come from international funding bodies. The value in such programmes is undeniable, as seen in the PMTCT and early child development programmes; clearly externally driven, top-down research has the advantage of yielding regionally and globally comparative norms, while at the same time providing rich data locally. It may, however, lack the depth and contextual relevance of the smaller, more qualitative studies initiated from the more intimate, personal perspective of a local researcher. The two approaches do complement each other, however, and one must not be sacrificed for the sake of the other.

It would also be valuable to identify impediments to new innovation so that these can be minimised if not removed (see Yankah[63] for an assessment of the impediments encountered by African doctoral students). Research ethics of the sort recommended

58 Raikes et al., 2017, pp. 1–23; Weurmli et al., 2015, pp. 1–6.
59 Petersen, 2017.
60 Bowman et al., 2006; Ka Sigogo Ngonyama & Modipa, 2004; Seedat, 1997, pp. 261–270.
61 Ka Sigogo Ngonyama & Modipa, 2004.
62 Mcleod, 2009, pp. 619–639.
63 Yankah, 2011.

by the South African San people[64] will also facilitate implementation of research, programmes and policy.

Several approaches might expand research on children and adolescents in Africa more rapidly and effectively:

- funding partnerships for research infrastructure and research workforce development;
- research collaborations (within Africa and from Africa to researchers in other countries);
- community-based research (to speed implementation); and
- scale-up of local experiments and innovations.

Research collaborations, especially if initiated by African researchers, can yield much but will require all research partners to embrace the key principles of mutual respect, mutual benefit, mutual interest and mutual responsibility.

Future opportunities

Given the likelihood of future opportunities to improve research infrastructure in Africa, African investigators would be wise to begin considering which areas, issues and opportunities are most ripe for development, and which merit long-term investment. South Africa, for example, has focused on expanding the number of doctorates in the country. Collaborative planning to address future research needs is typically the most effective. African children and youth need and will benefit from thoughtful planning and implementation of research focused on their healthy development.

References

Abubakar, A. (2014). Biomedical risk, psychosocial influences, and developmental outcomes: Lessons from the pediatric HIV population in Africa. *New Directions for Child and Adolescent Development*, 2014(146), 23–41.

Airhihenbuwa, C.O., Ford, C.L. & Iwelunmor, J.I. (2013). Why culture matters in health interventions: Lessons from HIV/AIDS stigma and NCDs. *Health Education and Behaviour*, 41(1):78–84.

Arnett, J.J. (2008). The neglected 95%: Why American psychology needs to become less American. *American Psychologist*, 63(7), 602–614.

Bowman, B., Seedat, M., Duncan, N. & Burrows, S. (2006). Race, social transformation and redress in the South African social and health sciences. In G. Stevens, V. Franchi & T. Swart (eds). *A Race Against Time*. Pretoria: Unisa Press.

64 Callaway, 2017, pp. 475–476.

Britto, P.R., Engle, P.E. & Super, C.S. (2012). *Handbook of Early Child Development Research and its Impact on Global Policy*. New York: Oxford University Press.

Bronfenbrenner, U. (1979). *The Ecology of Human Development: Experiments by Nature and Design.* Cambridge, MA: Harvard University Press.

Bronfenbrenner, U. (2005). Ecological systems theory. In U. Bronfenbrenner (ed.). *Making Human Beings Human: Bioecological Perspectives on Human Development.* Thousand Oaks, CA: Sage Publications.

Callaway, E. (2017). South Africa's San people issue ethics code to scientists. *Nature*, 543, 475–476.

Catalano R.F. (2007). Vollmer Award essay: Prevention is a sound public and private investment. *Criminology and Public Policy*, 6(3), 377–398.

Catalano, R.F., Fagan, A.A., Gavin, L.E., Greenberg, M.T., Irwin, C.E., Ross, D.A., … Shek, D.T.L. (2012). Worldwide application of prevention science in adolescent health. *The Lancet*, 379, 1653–1664.

Catalano, R.F., Gavin, L.E. & Markham, C.M. (2010). Commentary: Future directions for positive youth development as a strategy to promote adolescent sexual and reproductive health. *Journal of Adolescent Health*, 46 (3), S92–S96.

Cluver, L. & Gardner, F. (2007). The mental health of children orphaned by AIDS: A review of international and southern African research. *Journal of Child and Adolescent Mental Health*, 19(1), 1–17.

Diers, J. (2013). Why the world needs to get serious about adolescents: A view From UNICEF. *Journal of Research on Adolescence*, 23(2), 214–222.

Diop, M. (2014). Challenges and opportunities for building scientific capacity in Africa. Keynote address, UMSTEM-Africa Initiative Third Biennial Conference, Ann Arbor, Michigan. Retrieved from: https://www.ii.umich.edu/asc/initiatives/stem/biennial-conferences/u-m-stem-africa-initiative-third-biennial-conference.html

Institute of Medicine. (2013). *Evaluation of PEPFAR*. Washington, DC: The National Academies Press. Retrieved from: https://www.nap.edu/catalog/18256/evaluation-of-pepfar

International Monetary Fund (IMF). (2017). *Sub-Saharan Africa Regional Economic Outlook: Restarting the Economic Engine*. Washington, DC: International Monetary Fund. Retrieved from: https://www.imf.org/en/Publications/REO/SSA/Issues/2017/05/03/sreo0517

Iwelunmor, J., Newsome, V. & Airhihenbuwa, C.O. (2013). Framing the impact of culture on health: A systematic review of the PEN-3 cultural model and its application in public health research and interventions. *Ethnicity & Health*, 19(1), 20–46.

Ka Sigogo Ngonyama, T. & Modipa, T.O. (2004). Critical reflections on community and psychology in South Africa. In D. Hook (ed.). *Introduction to Critical Psychology*. Cape Town: UCT Press.

Kitayama, S. & Salvdor, C. (2017). Culture embrained: Going beyond the nature–nurture dichotomy. *Perspectives in Psychological Science*, 12(5), 841–854.

Kitayama, S. & Uskul, A. (2011). Culture, mind, and the brain: Current evidence and future directions. *Annual Review of Psychology*, 62, 419–449.

Kitayama, S., Varnum, M.E.W & Salvador, C. (2017). Cultural neuroscience. Why do we need it? In S. Kitayama & D. Cohen (eds). *Handbook of Cultural Psychology*, 2nd edn. New York: The Guilford Press.

Koller, S.H., Motti, F., Petersen, A.C. & Verma, S. (2017). Achieving positive youth development for youth globally: How far have we come and what is yet needed? In A.C. Petersen, S.H, Koller, F. Motti-Stefanidi & S. Verma. *Global Positive Youth Development*. New York: Routledge, pp. 301–310.

Krasny, M. & Doyle, R. (2002). Participatory approaches to program development and engaging youth in research: The case of an Intergenerational Urban Community Gardening Program. *Journal of Extension*, 40(5). Retrieved from: http://www.joe.org/joe/2002october/a3.php

Marfo, K. (2011). Envisioning an African child development field. *Child Development Perspectives, 5*(2), 140–147.

Masten, A.M. & Cicchetti, D. (2012). Risk and resilience in development and psychopathology: The legacy of Norman Garmezy. *Development and Psychopathology*, 24, 333–334.

Masten, A.M. & Tellegen, A. (2012). Resilience in developmental psychopathology: Contributions of the Project Competence Longitudinal Study. *Development and Psychopathology*, 24, 345–351.

Mcleod, C. (2009). Theory and South African developmental psychology research and literature. In J. Watts, K. Cockcroft & N. Duncan (eds). *Developmental Psychology*, 2nd edn. Cape Town: UCT Press, pp. 619–639.

Meaney, M.J. (2010). Epigenetics and the biological definition of gene x environment interactions. *Child Development*, 81, 41–79.

Meaney, M.J., Szyf, M. & Seckl, J.R. (2007) Epigenetic mechanisms of perinatal programming of hypothalamic pituitary-adrenal function and health. *Trends in Molecular Medicine*, 13, 269–277.

Mpofu, E. (2002). Indigenization of the psychology of human intelligence in Sub-Saharan Africa. In W.J. Lonner, D.L. Dinnel, S.A. Hayes & D.N. Sattler (eds). *Online Readings in Psychology and Culture*, Unit 5, Ch. 2. Bellingham, WA: Center for Cross-Cultural Research, Western Washington University. Retrieved from: http://www.wwu.edu/~culture

Muhati-Nyakundi, L.I., Kasese-Hara, M. & Gwandure, C. (2017). Accessing vulnerable children's lived experiences through visual stimuli illustrations (VSI). *Vulnerable Children and Youth Studies*, 12(2), 160–170.

National Research Council. (2014). *New Directions in Child Abuse and Neglect Research*. Washington, DC: The National Academies Press.

NCD Alliance. (2011). *A Focus on Children and Non-communicable Diseases (NCD)*. Retrieved from: http://ncdalliance.org/sites/default/files/resource_files/20110627_A_Focus_on_Children_&_NCDs_FINAL_2.pdf

Ndebele, M., Kasese-Hara, M. & Greyling, M. (2012). Application of the information, motivation and behavioural skills model for targeting HIV risk behaviour amongst adolescent learners in South Africa. *Journal of Social Aspects of HIV/AIDS*, 9(1), S37–S47.

Nsamenang, A. B. (1992). *Human Development in Cultural Context: A Third World Perspective.* Newbury Park, CA : Sage Publications.

Nsamenang, A.B. (2004). *Cultures of Human Development and Education: Challenge to Growing up in Africa*. New York: Nova.

Nsamenang, A.B. (2010). Childhoods within Africa's triple heritage. In G.S. Cannella & L.D. Soto (eds). *Childhoods: A Handbook.* New York: Peter Lang, pp. 39–54.

Nsamenang, A.B. (2013). Dilemmas of rights-based approaches to child well-being in an African cultural context. In D. Johnson, D. Agbényiga & R. Hitchcock (eds). *Vulnerable Children*. New York: Springer, pp. 13–25.

Nsamenang, A.B. & Akum, R.A. (2013). Cultures in the biology of human development. In T.S.M. Tchombe, A.B. Nsamenang, H. Keller & M. Fulop (eds). *Cross-cultural Psychology: An Africentric Perspective*. Limbe, Cameroon: Design House.

Nsamenang, A.B., Fai, P.J., Ngoran, G.N., Ngeh, M.M.Y., Forsuh, F.W., Adzemye, E.W., … Lum, G.N. (2008). Ethnotheories of developmental learning in the Western Grassfields of Cameroon. In P.R. Dasen & A. Akkari (eds). *Educational Theories and Practices from the 'Majority World'.* New Delhi, India: Sage Publications.

Nyamukapa, C.A., Gregson, S., Lopman, B., Saito, S., Watts, H. J., Monasch, R. & Jukes, M.C. (2008). HIV-associated orphanhood and children's psychosocial distress: Theoretical framework tested with data from Zimbabwe. *American Journal of Public Health*, 98(1), 133–141.

Obradović, J. (2012). How can the study of physiological reactivity contribute to our understanding of adversity and resilience processes in development? *Development and Psychopathology*, 24(2), 371–387.

Ortiz, I. & Cummins, M. (2012). *When the Global Crisis and Youth Bulge Collide: Double the Jobs Trouble for Youth.* UNICEF Social and Economic Policy Working Paper. New York: UNICEF. Retrieved from: https://www.unicef.org/socialpolicy/files/Global_Crisis_and_Youth_Bulge_-_FINAL.pdf

Patel, V., Araya, R., Chatterjee, D., Cohen, A., De Silva, M., Hosman, C., … Ommeren, M. (2007). Treatment and prevention of mental disorders in low-income and middle-income countries. *The Lancet*, 370, 991–1005.

Patel, V., Flisher, A.J., Hetrick, S. & McGorry, P. (2007). Mental health of young people: A global public-health challenge. *The Lancet*, 369, 1302–1313.

Pence, A.R. & Nsamenang, A.B. (2008). *A Case for ECD in Sub-Saharan Africa*. Retrieved from: https://bernardvanleer.org

Petersen, A.C. (2006). Conducting policy-relevant developmental psychopathology research. *International Journal of Behavioural Development*, 30, 39–46.

Petersen, A.C. (2009). Inconvenient truths: Behavioural research and social policy. In M.A.G. van Aken, R.E Tremblay & W. Koops (eds). *Development of Behaviour Problems.* New York: Psychology Press, pp. 229–245.

Petersen, A.C. (2012). Global science: Capitalizing on opportunities for Africa. Invited keynote presentation, University of Michigan African Studies Center STEM-Africa Conference at KNUST, Kumasi, Ghana.

Petersen, A.C. (2013). Researcher as bumblebee: Developing a science of adolescence integrating biology, using rigorous research methods and including girls. In R.M. Lerner, A.C. Petersen, R. Silbereisen & J. Brooks-Gunn (eds). *The Developmental Science of Adolescence: History through Autobiography.* New York: Psychology Press, pp. 356–372.

Petersen, A.C. (2017). *Translating Scientific Evidence into Public Policy.* Presentation at the ISSBD/EADP Regional Workshop on Syros Island, Greece.

Petersen, A.C., Koller, S.H., Motti-Stefanidi, F. & Verma, S. (2016). Global equity and justice issues for young people during the first three decades of life. In S.S. Horn, M. Ruck & L. Liben (eds). *Equity and Justice in Developmental Science: Implications for Young People, Families and Communities (V2), Advances in Child Development and Behaviour.* New York: Elsevier, pp. 289–320.

Petersen, A.C. & Taylor, B.C. (1980). The biological approach to adolescence: Biological change and psychological adaptation. In J. Adelson (ed.). *Handbook of Adolescent Psychology*. New York: Wiley, pp 117–155.

Pollak, S.D., Nelson, C.M., Schlaak, M.F., Roeber, B.J., Wewerka, S.S., Wiik, K. L., … Gunnar, M.R. (2010). Neurodevelopmental effects of early deprivation in post institutionalized children. *Child Development*, 81(1), 224–236.

Raikes, A., Yoshikawa, H., Britto, P. & Inuka, I. (2017). Children, youth and developmental science in the 2015–2030 global Sustainable Development Goals. *Social Policy Report*, 30(3), 1–23.

Richter, L.M., Victora, C.G., Hallal, P.C., Adair, L.S., Bhargava, S.K., Fall, C.H.D., … Cohorts Group (2012). Cohort profile: The consortium of health-orientated research in transitioning societies. *International Journal of Epidemiology*, 41(3), 621–626.

Rutter, M. (1987). Psychosocial resilience and protective mechanisms. *American Journal of Orthopsychiatry*, 57, 316–331.

Rutter, M. (2002). Nature, nurture, and development: From evangelism through science toward policy and practice. *Child Development,* 73(1), 1–21.

Rutter, M. (2006). Implications of resilience concepts for scientific understanding. *Annals of New York Academy of Sciences*, 1094, 1–12.

Rutter, M. (2012). Resilience as a dynamic concept. *Development and Psychopathology*, 24, 335–344.

Rutter, M. (2013). Establishing developmental psychopathology. In R.M. Lerner, A.C. Petersen, R.K. Silbereisen & J. Brooks-Gunn (eds). *The Developmental Science of Adolescence: History through Autobiography.* New York: Psychology Press.

Rutter, M., Kim-Cohen, J. & Maughan, B. (2006). Continuities and discontinuities in psychopathology between childhood and adult life. *Journal of Child Psychology and Psychiatry*, 163, 1009–1018.

Sameroff, A.J. (2010). A unified theory of development: A dialectic integration of nature and nurture. *Child Development*, 81, 6–22.

Sameroff, A.J. (2012). Discontinuity: The hallmark of developmental science. *International Journal of Developmental Science*, 6, 37–39.

Seedat, M. (1997). The quest for a liberatory psychology. *South African Journal of Psychology*, 27(2), 261–270.

Serpell, R. (2011). Social responsibility as a dimension of intelligence, and as an educational goal: Insights from programmatic research in an African society. *Child Development Perspectives*, 5(2), 126–133.

Serpell, R. & Marfo, K. (2009). Child development in Africa: Views from inside. In R. Serpell & K. Marfo (eds). *New Developments for Child and Adolescent Development*. Cambridge: Cambridge University Press, pp. 97–112.

Slemming, W. & Saloojee, H. (2013). Beyond survival: The role of health care in promoting ECD. In L. Berry, L. Biersteker, A. Dawes, L. Lake & C. Smith (eds). *Child Rights in Focus: Research, Advocacy and Education*. Cape Town: Children's Institute, University of Cape Town.

Smith, E.P., Petersen, A.C. & Leman, P. (2017). Positive youth development in diverse and global contexts. *Special Section Child Development*, 88, 1035–1397.

Tchombe, T.M.S., Nsamenang, A.B., Keller, H. & Folup, M. (eds). (2013). *Cross-cultural Psychology: An Africentric Perspective.* Limbe, Cameroon: Design House.

Times Higher Education. (2017). *The Best Universities in Africa, 2017*, 14 April. Retrieved from: https://www.timeshighereducation.com/student/best-universities/best-universities-africa.

United Nations Children's Fund (UNICEF). (2015). *Strategy for Health: 2016–2030*. Retrieved from: https://www.unicef.org/health/files/UNICEF_Health_Strategy_Final.pdf

Verma, S. & Petersen, A.C. (2015). Global concerns in adolescent health with a case study of India. In L. Jensen (ed.). *The Oxford Handbook of Human Development and Culture: An Interdisciplinary Perspective*. New York: Oxford University Press, pp. 355–376.

Wagner, C.S. & Jonkers, K. (2017). Open countries have strong science. *Nature News*, 550, 32–33.

Weurmli, A.J., Tubbs, C.C., Petersen, A.C. & Aber, J.L. (2015). Children and youth in low- and middle- income countries: Toward an integrated developmental and intervention science. *Child Development Perspectives*, 9(1), 1–6.

World Bank. (2017a). *Africa Higher Education Centers of Excellence Project*. Washington, DC: World Bank. Retrieved from: http://projects.worldbank.org/P126974/strengthening-tertiary-education-africa-through-africa-centers-excellence?lang=en

World Bank. (2017b). *Global Economic Prospects: Sub-Saharan Africa*. Washington, DC: World Bank. Retrieved from: http://www.worldbank.org/en/region/afr/brief/global-economic-prospects-sub-saharan-africa

Yankah, K. (2011.) Towards Building a Global Research Community in Higher Education. Keynote speech at closing dinner, University of Michigan Presidential African Scholars Program.

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