Early Socioemotional Development: Investigating Protective Factors That Support Resilience in a South African Birth Cohort Study

Joannes Sebastiaan Hendrikus (Stijn) de Leeuw

Thesis Presented for the Degree of

DOCTOR OF PHILOSOPHY

in the Department of Psychology

UNIVERSITY OF CAPE TOWN

June 2025

Supervisor

Professor Susan Malcolm-Smith, University of Cape Town

Word Count

41487

Page count

262

Author’s Declaration

I declare that the work in this dissertation was carried out in accordance with the requirements of the University's Regulations and Code of Practice for Research Degree Programmes and that it has not been submitted for any other academic award. Except where indicated by specific reference in the text, the work is the candidate's own work. Work done in collaboration with, or with the assistance of, others, is indicated as such. Any views expressed in the dissertation are those of the author.

Signature: **Date**: 10-June-2025

Publications

I confirm that I have been granted permission by the University of Cape Town's Doctoral Degrees Board to include the following publications in my PhD thesis, and where co-authorships are involved, my co-authors have agreed that I may include the publications:

Chapter 2: De Leeuw, J. S. H. & Malcolm-Smith, S. (2023). Investigating protective factors that boost resilience in children from low- and middle-income countries: A scoping review. *Vulnerable Children and Youth Studies*, *18*(3), 467–500. https://doi.org/10.1080/17450128.2023.2224121

Author contributions: I conceptualized and designed the study and formulated the aims and methodology of the study with input from my supervisor and co-author Susan Malcolm-Smith. She provided critical revisions of the manuscript for intellectual content. I conducted literature searches and screened the obtained records. I made a summary of each of 302 articles that were included for full review, and together with Professor Malcolm-Smith we reviewed the abstracts and reached consensus on the inclusion of articles. I also extracted data from the included studies and conducted risk of bias analyses in consultation with my co-author. I wrote the first draft of the manuscript, which was then reviewed by my co-author who contributed conceptual and intellectual insights.

Chapter 3: De Leeuw, J.S.H., Lake, M., Gering, M., Hoffman, N., Donald, K.A., Zar, H.J., Stein, D.J., & Malcolm-Smith, S. (2025). A bifactor model of childhood adversity in a longitudinal South African birth cohort study. *Assessment*, *0*(0). https://doi.org/10.1177/10731911251340221

Author contributions: I conceptualized and designed the study and formulated the aims and methodology of the study with input from my supervisor Susan Malcolm-Smith. I performed all the analyses, with statistical advice and guidance given by Marilyn Lake and Milton Gering. Marilyn Lake also contributed to data management. Heather Zar serves as the principal investigator for the main study and participated in revising the manuscript critically for intellectual content. Dan Stein and Nadia Hoffman lead the psychosocial study aspects and participated in revising the manuscript critically for intellectual content. I wrote the first draft of the manuscript, which was then reviewed by all co-authors who contributed conceptual and intellectual insights. Every author played a role in the completion of the final manuscript.

Signature: **Date**: 10 June 2025

Student Name: JSH (Stijn) de Leeuw **Student Number**: DLWJOA001

List of Acronyms

ACE/s	Adverse Childhood Experience(s)
AERM	Adversity Exposure-Response Model
AIC	Akaike Information Criterion
CD-RISC	Connor-Davidson Resilience Scale
CECV	Child Exposure to Community Violence
CFA	Confirmatory Factor Analysis
CFI	Comparative Fit Index
CI	Confidence Interval
CYRM	Child and Youth Resilience Measure
DCHS	Drakenstein Child Health Study
DF	Degrees of Freedom
EFA	Exploratory Factor Analysis
ECBQ	Early Child Behavior Questionnaire
FIML	Full Information Maximum Likelihood
HIC/s	High-Income Country/Countries
HREC	Human Research Ethics Committee
IPV	Intimate Partner Violence
KMO	Kaiser-Meyer-Olkin
LBC	Left-Behind Children
LMIC/s	Low- and Middle-Income Country/Countries
MLR	Maximum-Likelihood Estimator
MMAT	Mixed Methods Appraisal Tool
NPO	Non-Profit Organisation
PEDS	Pediatric Emotion Distress Scale
PTSD	Posttraumatic stress disorder
QCAE	Questionnaire of Cognitive and Affective Empathy
REML	Restricted Maximum Likelihood
RMSEA	Root Mean Square Error of Approximation
SASH	South African Stress and Health
SDQ	Strengths & Difficulties Questionnaire
SES	Socio-Economic Status
SRMR	Standardized Root Mean Square Residual

SSA	Sub-Saharan Africa
TLI	Tucker-Lewis Index
ToM	Theory of Mind
UCT	University of Cape Town
WHO	World Health Organization

Abstract

Globally, the prevalence of mental health challenges amongst children is increasing, raising significant concerns. Despite this, there remains a limited understanding of the protective factors that support resilience in children from low- and middle-income countries (LMICs). In high-risk contexts, resilience can serve as a critical buffer against adverse effects on mental health. However, the intricate interplay between risk and protective factors in young children has been insufficiently explored, despite the foundational role of early childhood experiences in shaping an individual's positive developmental trajectory.

In my thesis, I conducted a scoping review to summarise the current evidence on resilience in children aged 10 years and younger, synthesizing how resilience is conceptualised and operationalised in LMICs. I also presented a novel perspective on childhood adversity by examining both children's exposure to community violence and their emotional response. Finally, I investigated the relationship between resilience, adversity, and mental health outcomes over time in children aged 8 years and younger in the South African Drakenstein Child Health Study.

The scoping review revealed that only 26 studies from 14 countries investigated childhood resilience in LMICs, highlighting a significant paucity of data, particularly in longitudinal research. In my own study of adversity, I provided a novel bifactor model, with a general adversity factor (combining violence exposure and emotional responses) and four subscales, capturing nuanced emotional responses beyond frequency and severity of adverse exposures. Importantly, higher resilience scores were consistently linked to lower mental health difficulties over time, with significant interaction effects between adversity and resilience. Moderating effects were observed at individual levels (e.g., emotion regulation, temperament), relational levels (e.g., caregiver resilience, maternal employment), and

contextual levels (e.g., household income), underscoring the multifaceted nature of resilience in high-risk settings.

This thesis underscores the dynamic nature of resilience in the face of ongoing adversity during childhood in high-risk contexts. By identifying several protective factors at different timepoints, it makes a significant contribution to this underexplored area and emphasises the importance of designing resilience-focused interventions to mitigate mental health difficulties in young children from LMICs.

Dedications and Acknowledgments

This thesis would not have been possible without the collaboration of many incredible individuals. A heartfelt thank you to my supervisor, Professor Susan Malcolm-Smith, for your unwavering support and guidance, it's been a real pleasure working with you.

A big thank you to my co-authors, Professors Dan Stein and Heather Zar, for leading the remarkable DCHS research, and to Kirsty, Nadia, Marilyn, Colin, Milton, and Richard for your invaluable insights and support. To the Drakenstein study team, site leaders, field workers, clinic staff, and interpreters Thozama, Vuyo, and Siphokazi—thank you for your dedication. And above all, my deepest gratitude to the participants and their families—this research would not exist without you.

I am grateful for the support of the Prince Bernhard Culture Fund, the Dr Hendrik Muller Fund, and the Patrice L. Engle Dissertation Grant.

To my Little Lions team—what a journey! I can't wait to bring these learnings into practice, we are only getting started. To all my friends, near and far; thank you for understanding, pushing, and supporting me. To my family, my parents, and Tim and Dorien, all I ever wanted was to make you proud. To my library companions and the incredible librarians (Gill, Mary, Hanoria, and Matthew), thank you for making this journey bearable.

Finally, thank you to Heinrich for being the most understanding, loving, and caring partner. Now that PhD life is over, it's time for us to write our own chapter together.

I dedicate this to the children who persist, grow, and flourish despite life's challenges. Know that I see you, and that this thesis is not the end, it's only the beginning.

Table of Contents

List of Tables

List of Figures

Chapter 1 – General Introduction

This introductory chapter provides a conceptual framework to underpin the thesis, emphasizing the challenges of measuring protective factors that boost resilience. The conceptual framework links resilience to adversity and child mental health outcomes whilst identifying gaps in the existing literature. The chapter also highlights the Drakenstein Child Health Study (DCHS), a South African birth cohort study set in a peri-urban, low socioeconomic status (SES) community. This study, situated in two suburbs with a high prevalence of adversity typical of many communities in low- and middle-income countries (LMICs), offers a valuable opportunity to investigate protective factors that are associated with resilience and child mental health outcomes in a high-risk environment. The chapter concludes with the aims and structure of the thesis.

1.1 Overview

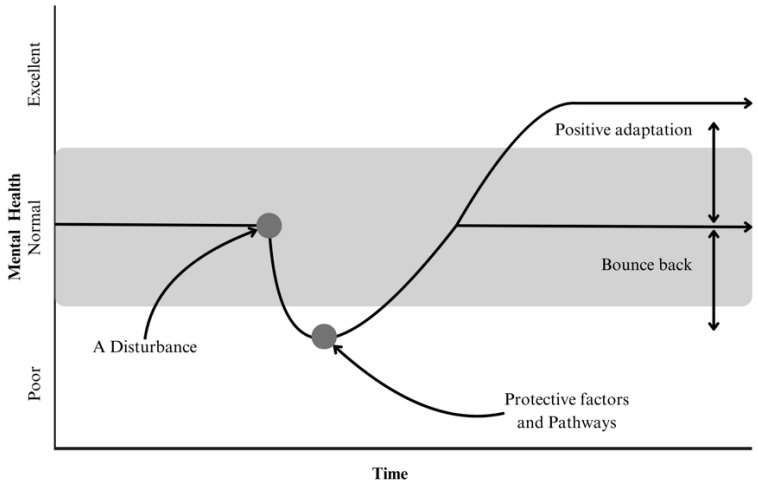
Resilience is commonly described as the capacity to bounce back from adversity and adjust effectively to new circumstances (Masten, 2011). This process is supported by certain protective factors and pathways that strengthen an individual's ability to thrive (Ungar & Liebenberg, 2011). The concept of resilience has evolved over the past decades, with growing recognition of its multidimensional nature (Wright et al., 2013). Resilience research has gained increasing attention in response to global challenges such as climate change, war, terrorism, and economic instability, as addressing these crises depends on the ability to recover and adapt to rapidly changing conditions (Masten, 2014). This means that research into protective factors (attributes, conditions, or interventions that mitigate the negative effects of adversity such as social support, parental support, empathy, emotion regulation) play a pivotal role in fostering resilience. These factors operate at multiple levels, including the individual, family, and community, and are influenced by cultural and contextual nuances

(Ungar, 2013). Yet, its application and understanding in specific sociocultural and economic contexts, such as South Africa, remain underexplored (Stein et al., 2015), especially in the context of children (Theron, 2023). Research into resilience is rooted in the realisation that there is a variation of adaptive behaviour and mental health outcomes, recognising that some people do well in high-risk contexts while others develop serious mental health difficulties and do poorly (Masten & Cicchetti, 2016). Instead of focussing on deficit-oriented models of mental health, resilience research opened up new directions of research supporting well-being and positive health (Southwick et al., 2014).

Resilience is a dynamic process with the ability to develop over time and to show variation across different developmental stages (Wright et al., 2013) in which an individual can actively cope with adversity (Luthar et al., 2000). Resilience should not be viewed as an isolated concept but as a dynamic interplay between risk and protective factors that influence mental health outcomes (Luthar et al., 2000). It can only be understood in the context of significant chronic or acute exposure to adversity, from which an individual demonstrates the ability to recover (Ungar, 2015). Adversity is a fundamental element of the resilience framework, as it must be identifiable to assess resilience, yet the precise nature of adversity investigated is often underemphasized or overlooked (Goldstein & Brooks, 2013). Drawing on existing literature (Masten & Cicchetti, 2016) and adapted to the context of child resilience, Figure 1 presents the resilience framework underpinning this thesis. It demonstrates how a significant adverse event can lead to a decline in mental health, followed by a period of reorientation. During this phase, pathways toward positive mental health outcomes are (often subconsciously) identified and activated, enabling a return to a state of normal or growth to excellent mental health.

Figure 1

Schematic Overview of Resilience Process



Source: Author's own interpretation of resilience - adapted from Masten and Cichetti (2016, p. 16)

Early studies on resilience revealed that children may exhibit distinct vulnerabilities and protective mechanisms at different stages of development compared to adolescents and adults (Masten et al., 2021) and the importance of culture and context was especially salient for this age-group (Ungar, 2004, 2013; Wright & Masten, 2015). However, research on this topic and age-group remains limited in LMICs (Mesman et al., 2021; Ungar, 2019). Greater insight is needed into the interplay between protective factors and resilience from an early age, particularly for children in disadvantaged communities (Masten, 2011). Additionally, further research is required to understand the developmental timing of adversity, resilience, and interventions, including how protective processes develop and when interventions should be implemented for maximum positive impact (Masten et al., 2021).

Comprehensive longitudinal studies remain relatively scarce, yet they are essential for understanding resilience processes (Mesman et al., 2021; Zolkoski & Bullock, 2012). By

capturing the dynamic interplay between adversity, resilience, and adaptation over time, longitudinal research can highlight how resilience unfolds across developmental stages (Sleijpen et al., 2013). Long-term resilience studies, in particular, can shed light on the advantages and challenges of both adversity and resilience in shaping future health and well-being (Masten & Cicchetti, 2016). This is especially critical in contexts of LMICs, where high-risk environments (Montgomery, 2010) intersect with strong cultural and social practices, necessitating longitudinal studies to contextualise the relevance of these practices for specific developmental phases (van Breda & Theron, 2018).

1.2 Conceptual Note on Resilience

The conceptualization of resilience is often misunderstood, with resilience frequently depicted as a static outcome or a singular construct. In this thesis, the term "resilience" refers to the dynamic and multifaceted interplay of protective factors and pathways that foster positive adaptation in the face of adversity. It encompasses the entire process and context-dependent nature of resilience, rather than a fixed trait or outcome. Thus, whenever the term "resilience" is used in this thesis, it signifies this broader, dynamic framework.

1.3 Study Context

This thesis seeks to fill gaps by focusing on children under the age of 10 in two high risk, low-resourced communities in South Africa, a country with a unique socio-political history and enduring socioeconomic challenges. The DCHS, a longitudinal birth cohort study, provides a valuable platform for investigating the interplay between adversity, protective factors, and child mental health outcomes, and South Africa offers a compelling context for resilience research.

The Republic of South Africa is a country marked by profound contrasts, dealing with the ongoing struggle of socioeconomic inequality, shaped by its historical legacy of colonialism and apartheid (Francis & Webster, 2019). Despite being the most industrialized and diversified economy in Africa, South Africa continues to face significant challenges, including power cuts, weak structural growth, high levels of poverty, rising levels of unemployment, and violence, which disproportionately affect under-resourced communities (World Bank, 2024). The historical roots of South Africa's socioeconomic challenges can be traced back to colonialism and apartheid (Olasupo & Hosea, 2024). During the apartheid era (1948–1994), policies were instituted to systematically marginalize non-white populations, restricting their access to quality education, employment opportunities, and land ownership, leading to persistent poverty and inequality (Francis & Webster, 2019). In the three decades since the end of apartheid and South Africa's landmark moment of its first democratic elections, mixed progress has been made in transforming the society and economy (Littlewood & Holt, 2018). Despite a promising start after 1994, for the first time in post-apartheid South Africa, poverty has started to increase since 2011 (Khumalo, 2021). Coupled with being one of the most unequal countries, with inequality numbers being on the rise, the country is faced with an environment where adversity is widespread (Francis & Webster, 2019). Furthermore, violence continues to be a pervasive challenge in South Africa, stemming from the above-mentioned deeply entrenched historical and systemic inequalities (Ward et al., 2012). Interpersonal violence remains the leading cause of injury in the country, with a homicide rate that is more than seven times the global average (Norman et al., 2007). The province of the Western Cape, where the Drakenstein area is situated, struggles with some of the country's highest rates of violence, predominantly due to gang violence (Mncube & Madikizela-Madiya, 2014).

The Drakenstein area, where the DCHS is based, exemplifies the realities of above-mentioned high-risk environments. The area, located approximately 60 kilometres northeast of Cape Town in the Western Cape Province of South Africa, encompasses a mix of urban, peri-urban, and rural communities (Gordon, 2020). Despite the area being one of the biggest contributors to the province's GDP and it having one of the highest average incomes in the country (Gordon, 2020), many residents live in low-income, under-resourced peri-urban settlements, characterized by high levels of poverty, unemployment, and limited access to services (Zar et al., 2015). The area around Paarl includes communities such as TC Newman and Mbekweni, where many families face inadequate housing, overcrowding, and poor infrastructure (Stein et al., 2015). These conditions contribute to a range of social and health challenges. Inhabitants of these areas are faced with high levels of adversity, including community violence, substance abuse (particularly alcohol abuse, often tied to the legacy of the "*dop system*" in farm work), unemployment and economic instability, and maternal and child (mental) health issues (Zar et al., 2015). The area is home to diverse cultural groups, including Afrikaans, isiXhosa, and English-speaking communities (Gordon, 2020). Despite the challenges, the Drakenstein area has notable strengths, including strong community ties, local cultural practices, and grassroots initiatives aimed at supporting families and children (Gordon, 2020).

1.4 Cohort Context: The Drakenstein Child Health Study

The DCHS is an ongoing, multidisciplinary, population-based birth cohort study exploring maternal and child health longitudinally. Initially, the study was primarily focussed on investigating the long-term impact of early lower respiratory tract infection and risk factors associated with childhood pneumonia (Zar et al., 2015). Over time, the scope of the

study expanded to explore a broader range of biological, social, and environmental influences on child health and development.

1.4.1 Study Design and Recruitment

Pregnant women were recruited from two primary health care clinics, Mbekweni (serving a predominantly isiXhosa speaking, black African community) and TC Newman (serving a predominantly Afrikaans speaking, mixed ancestry community). Racial classification is a product of the apartheid system, reinforcing a segregated society that persists up to the present (Ward et al., 2012), but will only be used here for descriptive purposes. Since only few people migrate out of the region, the population is stable. The vast majority of the residents (90%) attend public health care services, with Paarl hospital as main health care centre (Zar et al., 2015).

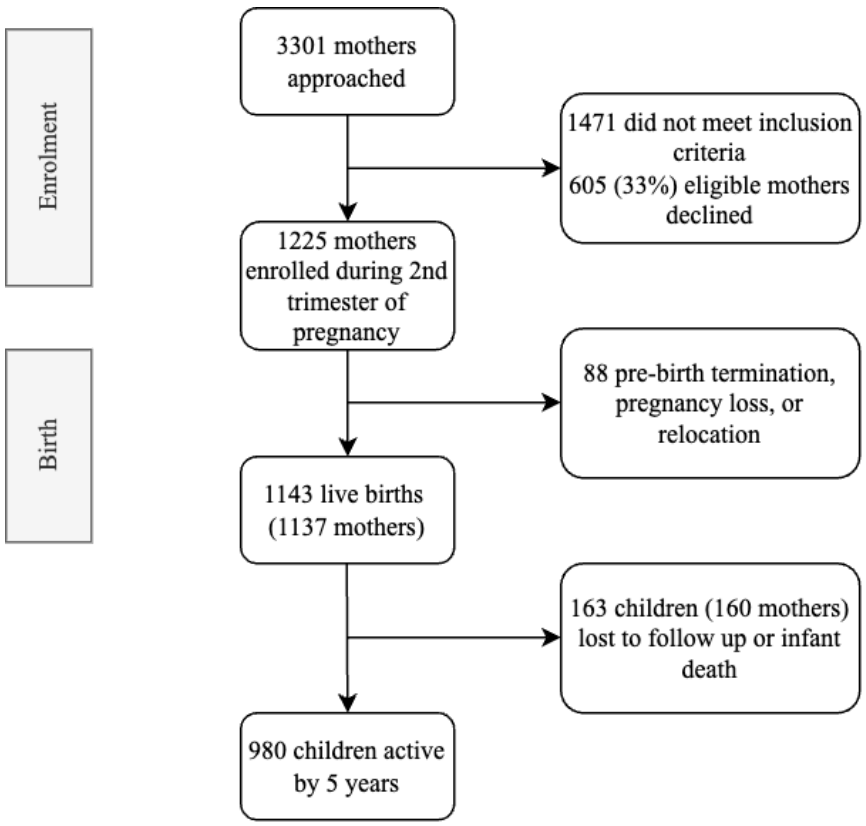
To be eligible to participate in the study pregnant women had to be at least 18 years of age, attend one of the two primary health care clinics in Mbekweni or TC Newman for antenatal care, have no plans of moving out of the district in the following year, and sign written informed consent. Mothers were enrolled in the DCHS at 20 to 28 weeks' gestation while attending routine antenatal care and were prospectively followed. Between March 2012 and March 2015, 1,225 pregnant women were enrolled into the DCHS antenatally; 88 (7.2%) mothers were lost to follow up antenatally, had a miscarriage or a stillbirth. In total, 1137 women gave birth to 1,143 live infants (4 twins and 1 triplet) (Zar et al., 2015). At the 5-year timepoint, 980 participants were still actively involved, showing exceptionally high retention rate (see Figure 2).

Antenatal and postnatal study visits were conducted at primary healthcare clinics, while birth, six-week, and annual follow-ups occurred at Paarl Hospital. Study visits were synchronised with national healthcare and immunization schedules, including diphtheria,

tetanus, acellular pertussis, Hib, and inactivated polio vaccine at 6, 10, and 14 weeks and 18 months; measles vaccine at 9 and 18 months; and the 13-valent pneumococcal conjugate vaccine (PCV13) at 6 weeks, 14 weeks, and 9 months. Fathers identified by the mothers were invited to participate in an antenatal study visit. To investigate environmental risk factors, two home visits were conducted: one antenatally and another four months postnatally. Infants attended follow-ups aligned with the national immunization schedule where possible, with study visits at 6, 10, and 14 weeks; and 6, 9, 18, months, followed by six-monthly assessments thereafter until 7 years. Assessments were then followed up annually, with the oldest children currently attending their 12-year assessments (Zar et al., 2015, 2020).

Figure 2

Flow Chart DCHS General Sample (Enrolment and Birth)



Although the sociodemographic characteristics of the DCHS active sample (N = 980) and those lost to follow up (N= 163) are generally similar, the latter group tended to have higher household income and greater levels of maternal education compared to those remaining in the study (see Table 1). One possible explanation is that participants with lower income may have been more motivated to continue participating, since the study provides access to physical and mental health services that might otherwise be difficult to obtain without the provided travel reimbursements. Additionally, families with higher income may have faced time constraints that contributed to study attrition.

Table 1

Sociodemographic Characteristics of DCHS Active Sample and Sample Lost to Follow Up

		Active sample (N = 980)	Inactive sample (N = 163)	*p*-value *
Child Sex	Female	49.0%	47.2%	0.74
Household Monthly Income	<R1000	35.1%	25.9%	0.028*
	R1000-R5000	52.5%	50.6%	0.728
	>R5000	12.5%	23.5%	<0.001*
Education	Lower than secondary	62.7%	49.7%	<0.01*
Employment	Unemployed	49.8%	46.0%	0.418
Food Security	Food Secure	71.3%	76.2%	0.301

1.4.2 Psychosocial Assessments

The DCHS also incorporated extensive psychosocial measures to examine both risk and protective factors, including exposure to violence, parental substance use, parenting practices, and attachment (Donald et al., 2018; Stein et al., 2015). Mothers completed assessments at various antenatal and postnatal time points, and dyadic mother-child interactions were recorded at 6 weeks, 3.5- and 4.5-years. Basic demographic and health data

were extracted from hospital records, while child cognitive and general development was assessed at multiple stages.

Early child development evaluations were conducted by trained physiotherapists and occupational therapists, supervised by a paediatric neurodevelopmental specialist. Cognitive assessments, covering language, fine motor skills, executive functioning, memory, and general social cognition, were administered by trained research assistants, with interpreters available when needed. Socio-emotional development was measured through observational, self-report, and parent-report tools, capturing aspects such as emotional regulation, social attention, empathy, morality, temperament, prosocial behaviour, and callous-unemotional traits. These assessments took place at community centres near the two participating clinics. A subset of participants also underwent neuroimaging at the Cape Universities Body Imaging Centre (Donald et al., 2018).

1.4.3 Child Assessments and Referral Pathways

During child visits adequate breaks were provided to prevent fatigue, and participants received compensation for their time and travel per visit, a standard amount for similar South African studies. Assessors were qualified professionals and research assistants, ensuring high-quality developmental assessments. Given the sensitive nature of certain measures, like the Child Exposure to Community Violence (CECV) scale, an essential component of the study was identifying instances of abuse, trauma, and mental health concerns. A structured referral system was in place, facilitated through strong collaborations between study staff and provincial health services. All participating mothers, regardless of specific concerns, were informed about available social and support services. Assessors and clinic staff were trained in Standard Operating Procedures (SOPs) to flag cases requiring referral (Donald et al., 2018; Tsunga et al., 2023).

1.4.4 Ethical Consideration

Mothers were provided informed consent in their preferred language, English, Afrikaans, or isiXhosa, by trained study staff from the community. Informed consent forms described the scope and aims of the study, including potential harm or benefits. Written informed consent from mothers is renewed annually (Donald et al., 2018). Mothers were informed at enrolment and during the annual re-consent process that they could withdraw from the study at any time or decline participation in specific components of the research, without any impact on the care they or their child received. All interviews were conducted in private settings, and participant data were de-identified and accessible only to study staff to maintain confidentiality. Efforts were made throughout all study visits to prioritize the comfort of participating children. Interviews and assessments were carried out in private spaces, and both mothers and children were offered breaks during longer sessions to reduce fatigue and support wellbeing.

The DCHS was granted ethical approval by the Faculty of Health Sciences Human Research Ethics Committee (HREC), University of Cape Town (UCT) (401/2009), and by the Western Cape Provincial Research committee (2011RP45). Additional ethical approval for this thesis was granted through the UCT Ethics Review Committee of the Faculty of Humanities (PSY2019-007) and Faculty of Health Sciences HREC (017/2020).

1.5 Fieldwork

At the start of my PhD, from August 2018 to February 2021, I conducted cognitive and socioemotional developmental assessments with children during their 3.5-, 4.5-, 5, 5.5-, and 6-year visits. Twice a week, I travelled to the Mbekweni site, where I worked closely with translators to facilitate communication between English and isiXhosa. On a typical day

we assessed two children and their caregivers. Each session, lasting approximately two hours, included both the developmental assessment and psychosocial questionnaires for the caregivers. Amongst the measures that are included in this thesis, I administered assessments such as the CECV, the Pediatric Emotion Distress Scale (PEDS), Rydell's emotion questionnaire, Theory of Mind (ToM) tasks, and the Early Child Behavior Questionnaire (ECBQ). Unfortunately, the Child and Youth Resilience Measure (CYRM) was administered at the main clinics by local staff, and I was not directly involved in its administration.

This fieldwork profoundly shaped my understanding of the context in which this research is embedded. Working directly with the primary stakeholders of the community in which my thesis is embedded provided invaluable insights. Assessing children's exposure to violence as young as 3.5 years old, alongside subsequent evaluations, deepened my comprehension of the data and its real-world implications. Combined with my experience as a Clinical Developmental Psychologist and founder of a South African child mental health non-profit organisation (NPO), this hands-on involvement has greatly informed my ability to interpret the findings of this thesis in a context-specific and meaningful manner.

1.6 Study Aim

As discussed briefly, significant gaps exist in the literature on resilience. Firstly, while the majority of children globally live in LMICs, there is limited knowledge about the protective factors that bolster resilience in young children within these contexts. There is also a pressing need to summarise the current evidence on how resilience is conceptualised and operationalised in LMICs. Secondly, it is critical to ensure that adversity is clearly identifiable within resilience frameworks. Lastly, a longitudinal assessment of protective factors that are related to resilience in young children in LMICs is required to understand their interactions with mental health outcomes over time.

This thesis aims to address these gaps by foregrounding the protective factors that are associated with resilience over time in young children from a high-risk, low-income South African birth cohort study. Furthermore, this thesis seeks to deepen understanding of the interplay between resilience, adversity, and mental health outcomes. The thesis is structured around three key research objectives:

1.6.1 Objective One

To identify and consolidate existing evidence on protective factors that enhance resilience in children aged 10 years and younger in LMICs, while highlighting gaps in knowledge (Chapter 2, p. 15-45).

1.6.2 Objective Two

To present a comprehensive perspective on childhood adversity by examining children's exposure to community violence and their subsequent emotional response (Chapter 3, p. 46-78).

1.6.3 Objective Three

To investigate the relationship between resilience, adversity, and mental health outcomes over time in children aged 8 years and younger in a South African birth cohort study (Chapter 4, p. 79-148).

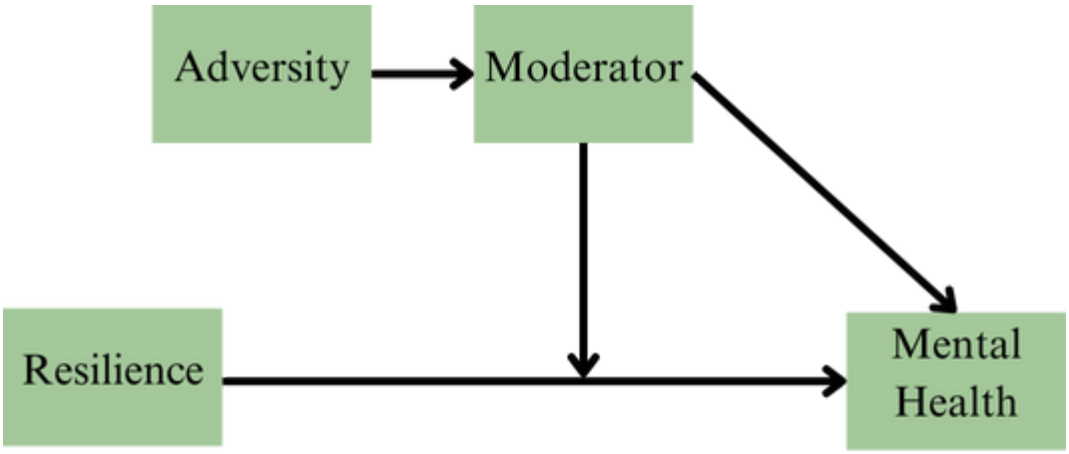
1.7 Overview and Structure of the Thesis

This thesis aims to contribute to the expanding body of research on resilience by focusing on protective factors in relationship to resilience in children, especially within the particular context of LMICs. By examining resilience from a South African perspective, this research seeks to address critical gaps in the literature and provide insights into child mental health outcomes in high adversity settings.

This introductory chapter has provided the groundwork for the thesis by highlighting the significance of resilience research, identifying critical gaps in the literature, and situating the study within the South African context. Next, a scoping review chapter is presented which reviews the literature investigating protective factors that boost resilience in children aged 10 years and younger in LMICs. Following this, a conceptual paper is presented which introduces a novel bifactor model to measure childhood adversity using two existing measures. Building on these foundations, the subsequent chapter explores resilience in children from the (DCHS) cohort, focusing on the interaction with childhood adversity, moderators, and mental health outcomes between the ages of 5 and 8 years (see Figure 3). Finally, the general discussion chapter synthesizes the key findings and contributions of the research, addresses its limitations, and provides recommendations for future studies and practical applications. The thesis concludes with reflections on its overall significance.

Figure 3

Schematic Overview of Resilience and Moderator Model



Chapter 2 – Investigating Protective Factors That Boost Resilience in Children From Low- and Middle-Income Countries: A Scoping Review

This chapter has been published online: De Leeuw, J. S. H. & Malcolm-Smith, S. (2023). Investigating protective factors that boost resilience in children from low- and middle-income countries: A scoping review. *Vulnerable Children and Youth Studies, 18*(3), 467–500. https://doi.org/10.1080/17450128.2023.2224121

Permission has been granted by the UCT Doctoral Degree Board to include the publication in my thesis.

2.1.1 The Poorly Researched Concept of Resilience in LMICs

Many children growing up in LMICs are at a particular risk for poor developmental outcomes, with almost one-third of the children under the age of 5 not meeting basic cognitive and socioemotional milestones and many children not able to meet their developmental potential (McCoy et al., 2016). Generally, the risk factors (i.e. poverty, malnutrition, but also low maternal mental health and inadequate learning opportunities) affecting the development of these vulnerable children are well-described (Walker et al., 2011) but research on protective factors that can buffer these risks and boost psychological resilience seems to be lacking in LMICs (Stein et al., 2015).

The core concept when describing resilience is the ability to bounce back after hardship and adapt positively to new circumstances (Masten, 2011). However, resilience does not have a single, agreed upon definition: it is a relatively novel and complex construct which incorporates many factors (Kolar, 2011; Luthar et al., 2000). Measuring the two core aspects of resilience 'exposure to significant threat or severe adversity' and 'positive adaptation' poses a challenge since these concepts are rather broad and lack precise definition. Moreover, simply stating that 'a child is resilient' is not particularly useful (Ungar, 2015), because more

in-depth information is needed to articulate the factors and processes contributing to resilience. Consequently, when discussing resilience, less emphasis should be put on the dichotomous answer to whether there is resilience or not; instead, the importance of the available resources that may bolster resilience needs to be stressed (Ungar & Liebenberg, 2011) with less emphasis placed on behavioural outcomes (Masten, 2011).

2.1.2 A Problematic Universalization of Resilience

Most research on resilience and protective factors has been done in High-Income Countries (HICs). Yet in less developed countries, exposure to community violence for instance, is often rife and maternal depression, childhood poverty, malnutrition, and maternal HIV can be more prevalent (Stein et al., 2015) – the adversities and risk exposures are thus different for individuals from LMICs, compared to those from HICs (Brittain et al., 2015). Many children in LMICs have an increased risk on stunting (one-third of children under the age of 5 years), only 10-41% of the children receive cognitively stimulating parenting, and major armed conflict happened in about 27-38% of developing countries between 1990-2003 alone (Walker et al., 2007) . Regarding research in disadvantaged communities in LMICs, resilience seems to be exhibited as a process with multilevel domains that cannot be seen independently from experiences of adversity (Giordano, 2010). Hence, a certain sensitivity to cultural and societal differences that bolster resilience within disadvantaged contexts should be adopted (Kolar, 2011). One example of such a cultural difference is that in most under-resourced countries formal safety nets are lacking, leaving it to families and community members to help unburden an individual and form a buffer for negative events (Bhana & Bachoo, 2011). In their systematic review on resilience in an African youth context, Theron et al. (2013, p. 75) mention an ‘Afrocentric emphasis on the interrelatedness of individual and

community' which makes for a distinctively different resilience profile compared to individuals from HICs.

2.1.3 Lack of Developmental Perspective in Resilience Research

Moreover, how do these cultural and societal differences manifest specifically in young children from LMICs? Children possess natural, inborn protective systems that allow them to adapt to adversities, their internal protective factors (Southwick et al., 2015). Due to children's natural vulnerability and high levels of dependency, their capacity for positive adaption and resilience will greatly depend on many other systems like families, communities, religion, and school, all external protective factors (Bronfenbrenner & Morris, 2006; Masten, 2011; Southwick et al., 2014). These systems will differ for children from LMICs versus HICs (as described above), which can potentially lead to (culture) specific protective factors that boost resilience in young children from LMICs (Ungar, 2011). However, more insight is needed regarding the interplay of protective factors and resilience from an early age (Mosavel et al., 2015), especially for children from disadvantaged communities (Masten, 2011) where there is a major paucity of data regarding this topic (Stein et al., 2015).

2.1.4 Why Resilience Needs to be Tracked over Time

In general, there seems to be a window of opportunity when certain protective processes come into play to favour resilience in children (Masten, 2011) and to identify this sensitive period and pathways leading up to resilience, longitudinal research is needed (Theron & Theron, 2010). Longitudinal data has the potential to show how individuals respond to adversity and whether this response changes over time, and to enhance understanding of potential protective processes. The longitudinal perspective can help clarify

when and how adaptation takes place (Sleijpen et al., 2013). Moreover, longitudinal data may show the dynamic protective processes underlying resilience (as opposed to it being a personal trait that does not vary over time), by uncovering the influence of certain external factors over time. Particularly within LMICs research needs to be focussed on development in adverse conditions, and how positive mental adaptation and well-being fits within that development (Cosco et al., 2017; Montgomery, 2010). However, longitudinal research in young children from disadvantaged contexts is lacking (Theron & Theron, 2010).

2.1.5 Aim and Objective

The lack of data on protective factors and processes that can boost resilience in vulnerable young children in high-risk countries is apparent. This paucity is particularly pertinent when investigating the socio-cultural differences highlighted above. Risks like malnutrition, exposure to violence, lack of access to basic (mental) health care, lack of a cognitive stimulating environment, extreme childhood poverty, and low maternal (mental) health are often amplified in LMICs, but formal safety nets (i.e., easy access to quality health care, social security, government support) are lacking which leaves the most vulnerable of the community, children, at risk. Getting a better understanding of early developmental processes that bolster resilience in LMICs is key to informing properly targeted interventions in these contexts. Therefore, the primary aim of this research was to complete a scoping review of studies conducting (longitudinal) investigation of resilience and protective factors that bolster resilience in LMICs in children under the age of 11 years. The objective was to investigate the extent to which protective factors that boost resilience have been investigated in LMICs at all, and whether specific protective factors emerge.

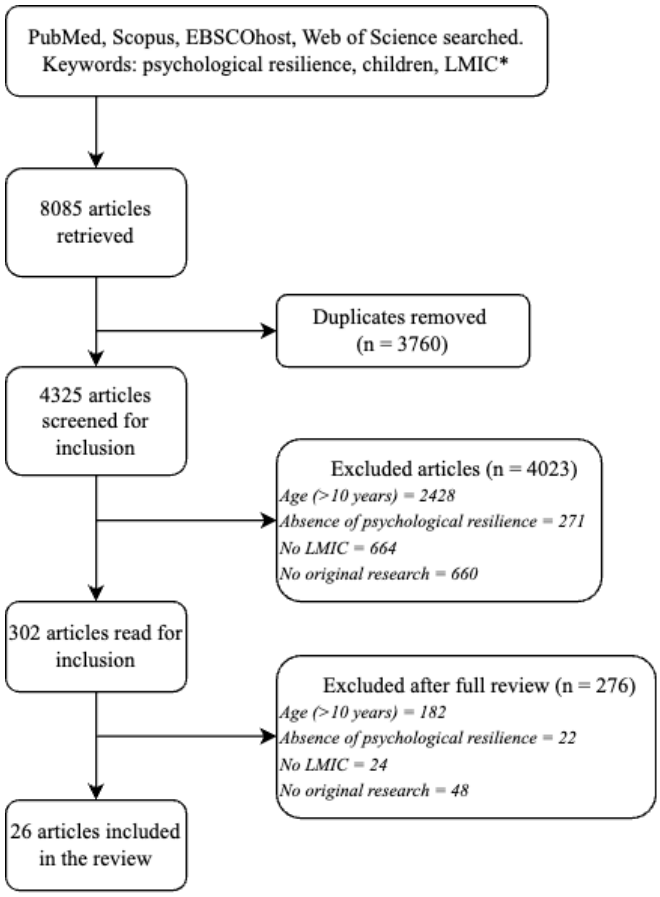
2.2 Method

2.2.1 Search Strategy

In February and March 2022, a first literature search of different electronic databases was conducted. The final search was conducted in February 2023. The search strategy was designed and refined with the help of a librarian from the UCT Health Sciences library. The following range of electronic databases were searched: EBSCOHOST (Africa-Wide Information, CINAHL, MEDLINE, APA PsycINFO, and APA PsycARTICLES), Pubmed, Scopus, and Web of Science. The search terms used were psychological, social, psychosocial, or emotional resilien* (for resilience, resiliency and resilient), child or children or youth or youths, LMICs, and longitudinal study or longitudinal studies (see Appendix A – Scoping Review Search Terms). Reference lists of the included studies were hand searched for eligible studies. The program Endnote (version X9-macOS) was used to store and manage records during the search procedure, to remove duplicate studies and assist in obtaining full text records. The literature retrieval process is described in Figure 4. The search and first screening of the articles was done by the first author, and a summary of each of 302 articles that were included for full review was made. These summaries were presented to the second author together with the abstracts and during several meetings they reached 100% agreement on the inclusion of the articles.

Figure 4

Search Results Flow Diagram



* See Appendix A – Scoping Review Search Terms

2.2.2 Selection Criteria

The inclusion criteria were:

- Peer reviewed papers published between January 2000 and February 2023, no language limitations.
- Mention of resilience and/or protective factors that boost resilience and child wellbeing in title, abstract or full text.
- Longitudinal studies, randomized controlled trials, cross-sectional studies, mixed-methods, qualitative, and cohort studies.

- Studies with participants aged up to 10 years and 11 months, or studies with a wider age range but a mean age below 11 years or that mention separate results for different age groups. Mean age of the participants had to be 10 years and 11 months, or younger, at the final timepoint in a follow-up study.
- Studies that were done in an LMIC[1]

We excluded studies that:

- Were (systematic) reviews, meta-analyses, any methodological papers, unpublished dissertations, and editorials.
- Did not mention psychological resilience or protective factors that boost resilience, or that mentioned medical, biological, genetic, or academic resilience.
- Did not mention the age of the participants or where it was impossible to derive whether the age was within our age criteria.
- Were done in HICs or that included participants from LMIC that (recently) relocated to a HIC.

2.2.3 Data Extraction

For each included study various data items (where applicable) were extracted. Information extracted included the following: author(s) and year of publication, aim of the study, study population and context, participant demographics (including age and gender), years of study, outcome measures, and a summary of the most important findings and adversities (see Table 2). Study quality for longitudinal, intervention, cross-sectional and cohort studies was assessed using a modified Downs and Black instrument (Downs & Black,

[1] Classified as such using data from the World Bank, retrieved on 24th of April 2022 via https://datahelpdesk.worldbank.org/knowledgebase/articles/906519-world-bank-country-and-lending-groups

1998). Questions in the original Downs and Black instrument (27 items) that referred to intervention and trial study methodology were excluded for the relevant studies (see Appendix B – Downs and Black Instrument). Downs and Black score ranges were given corresponding quality levels. (see Table 3 for information on longitudinal, cross-sectional, and cohort studies and Table 4 for information on intervention studies). Quality assessment for mixed-method studies was done using the Mixed Methods Appraisal Tool (MMAT – see Appendix C – Mixed Methods Appraisal Tool), version 2018 (Hong et al., 2018). An overall score could not be calculated using this tool, but the quality for the studies was considered by contrasting their results (see Table 5).

Table 2

Charting of Included Studies – Sorted by Study Design

Longitudinal Studies

Author(s)	Aim	Study Population	Outcome Measures*	Study Duration or Time Points [Mean Age]	Findings	Adversity
Chen, Q (2021)	Investigation of relationship between ego-resiliency and perceived social support, and their subsequent change trajectories across four timepoints.	China – 681 primary school students (52.2% boys) were included. At the final timepoint the sample had 437 participants left (51.5% boys).	*Resilience* • Ego-resiliency scale (C) *Perceived social support:* • Adapted version of the Perceived Social Support Scale (C)	T1 [8.87] – T4 [10.99] *(Data collection at 6, 12, and 18 months)*	Primary school children's ego resiliency increased over time, whilst perceived social support decreased over time. However, perceived social support had a positive influence on resilience at all four time points. This suggested that resilience may increase with age, and that different developmental stage may have unique resilience patterns.	*Direct measure* • No *Contextual adversity:* • Stressful school/academic events
Ding (2022)	Exploration of the change trajectory of resilience over 2 timepoints and its associations with emotional and behavioural health.	China – 1463 LBC (55.2% boys) from 26 pre-schools in three cities were included. At the final timepoint there were 568 children (54.6% boys) still included and all children above 6yrs old had by then left pre-school.	*Family Functioning* • Adaptation Partnership Growth Affection Resolve (APGAR; P) *Resilience* • Devereux Early Childhood Assessment for Pre-schoolers (DECA-P2; P) *Child Behaviour*: • Strength and Difficulties Questionnaire (SDQ, P) • Children's Sleep Habits Questionnaire (CSHQ, P)	T1 [4.6y] – T2 [4.2y] *(One year follow-up)*	Resilience amongst pre-school LBC was not stable, four patterns were discovered: stable-high, increasing, declining, and stable-low. Most of the pre-school LBC had lower resilience levels (62.7%). Maternal education level, increasing frequency of parents returning, and children with prosocial behaviours predicted higher levels of resilience.	*Direct measure* • No *Contextual adversity:* • LBC • Loneliness • Poor caregiving • Deprivation of early learning stimulation
Koshy (2022)	A longitudinal follow-up evaluating resilience and its association with current cognition and early childhood home environments.	India – 206 children (47% boys) were available at follow-up 9 years later in a birth cohort study, all from 8 adjacent heavily populated slums.	*Resilience* • Child Youth Resilience Measure (CYRM, C) *Cognition*: • Malin's Intelligence Scale for Indian Children (MISIC, C) *Child Support* • Home Observation for Measurement of the Environment (HOME) Scale (P) *Maternal Mental Health* • Self-Reporting Questionnaire-20 (SRQ-20, M)	T1 [2y] – T2 [9y]	Early childhood stimulating home environment and daily stimulation was a contributor to resilience at 9years, highlighting the importance of a stable home as foundation for later life. Children's individual resilience domain was associated with verbal cognition at 9years. Maternal depression at 2y was negatively associated with resilience at 9years, stressing the need to boost maternal mental well-being	*Direct measure* • Socio-Economic status at 2y (WAMI tool) *Contextual adversity:* • Early childhood poverty • Poor sanitation • Under-resourced
Rotheram-Borus	Examination of resilience amongst	South Africa –	*Cognition*:	Birth to 5yrs old	Maternal HIV status did not affect resilience among uninfected/HIV exposed children at the	*Direct measure* • No

(2019)	children of mothers living with and without HIV.	1238 children (% boys unknown) and their mother (living with or without HIV) from a population cohort, tracked over five years. All families lived in townships. At the final timepoint, 1073 mother-child pairs were still included.	• Bayley Scales of Infant and Toddler Development (BSID-III, C) • Peabody Picture Vocabulary Test (PPVT, C) • Kaufman Assessment Battery for Children (K-ABC; Mental Processing Index; C) *Child behaviour*: • Child Behaviour Checklist (CBCL, P) • Strength and Difficulties Questionnaire (SDQ, P)	*(Data collection at 2 weeks, 6, 18, 36 & 60months)*	age of 5. Typical protective factors (i.e., home visiting, breastfeeding, pre-school attendance) were not associated with development of resilience in the first 5 years of life. Lower income, food security, no live-in partners, fewer adults in the households and better maternal (mental) health were associated with resilient children.	*Contextual adversity:* • Maternal health risks / HIV • Poverty • IPV • Unemployment • Solo parenting

Cross-sectional studies

Author(s)	Aim	Study Population	Outcome Measures	Age Range [Mean]	Findings	Adversity
Barbarin (2001)	Examination of the effects of exposure to violence on coping resources and psychological adjustment.	South Africa – 625 black South African children (50% boys) living in a township with consistent exposure to political, familial, and community violence	*Family Relations* • Family Relations Scale (M) *Child behaviour*: • CBCL (M) • Behavior Problem Index (BPI, M) *Academic Motivation* • Health Resources Inventory (M) *Resilience* • South African Child Assessment Schedule (SACAS, M) *Maternal Distress* • Pitt Depression Inventory (PDI, M)	5y [?]	Independent of gender or economic status (within an already poor community), violence had a strong negative influence on child outcomes, with community violence as the strongest influence. Child resilience was able to mitigate the negative effects only partly.	*Direct measure:* • Variety of violence exposures (interviews of community members and archival data} *Contextual adversity:* • Poverty • Maternal HIV
Chen, H (2021)	Effect of emotional ability, age, and gender on resilience coping.	China – 289 pre-schoolers from one relatively developed region and a medium developed region.	*Emotional Ability* • Experiment (C) • Emotional Regulation Scale (P) *Resilience* • Devereux Early Childhood Assessment for Pre-schoolers (DECA-P2; P)	3-6y	Children of different ages had significant differences in scores of emotional ability and resilience. Initiative and self-regulation increased with age, whilst attachment and relationship decreased. The resilience levels of girls were higher than of boys, with boys displaying more behavioural problems. Higher emotional understanding, regulation, and ability was linked to higher resilience.	*Direct measure:* • No *Contextual adversity:* • ?
Christodoulou (2022)	Examination of neighbourhood factors predicting child resilience.	South Africa – 1238 children (% boys unknown) and their young mothers (living with or	*Cognition*: • Bayley Scales of Infant and Toddler Development (BSID-III, C) • Peabody Picture Vocabulary Test (PPVT, C)	5y	Several structural factors were associated with child resilience: formal housing with electricity and access to water, lower income, and food security. Surprisingly, more resilient children	*Direct measure:* • No *Contextual adversity:*

		without HIV) from a population cohort, tracked over five years. All families lived in townships. This study was focussed on the final timepoint, with 1073 mother-child pairs still included.	• Kaufman Assessment Battery for Children (K-ABC; Mental Processing Index; C) *Child behaviour*: • Child Behaviour Checklist (CBCL, P) • Strength and Difficulties Questionnaire (SDQ, P)		moved to rural areas with their mothers than non-resilient children, where possibly social support from the extended family can be seen as protective factor.	• Maternal health risks • Poverty • IPV • Unemployment • Solo parenting
Donald (2019)	Observational birth cohort study tracking risk factors and protective factors that bolster resilience.	South Africa – 734 children (52% boys) from low-income communities and their mothers	*Maternal mental health:* • IPV (M) • Edinburgh Postnatal Depression Scale (EPDS; M) • Childhood Trauma Questionnaire (M) • Self-Reporting Questionnaire (SRQ, M; psychological distress) *Child Development* • BSID-III (cognition, receptive and expressive language, fine and gross motor; C)	2 [24.07m]	Several important risk and protective factors were found in this birth cohort study that contribute to the development of children in their first two years. Risk factors include poor maternal (mental) health and child gender, with boys appearing to be at higher risk of poorer development. Protective factors that can act as a buffer include better home circumstances and higher maternal education status.	*Direct measure:* • Maternal (mental) health risks • IPV *Contextual adversity:* • Low-socioeconomic status • HIV • Community violence
Ebersöhn (2015)	Measuring resilience in young children affected by maternal HIV/AIDS using a mixed-method design, validating a qualitative projective story-telling technique.	South Africa – 19 HIV-negative children (42% boys) with their HIV-infected mothers living in a townships.	*Child behaviour*: • Child Behaviour Checklist (CBCL, M) *Resilience* • Düss Projective storying (C) – Qualitative	6y [5.6y – 6.11y]	Despite the very small sample, some interesting findings were that children used emotional intelligence (regulation) as an internal source to adapt, alongside positive future expectations, and material resources. They also expressed a sense of belonging to their families. These young children also voiced knowledge of chronic risk and adversity within their community.	*Direct measure:* • No *Contextual adversity:* • HIV/AIDS • Poverty • Discrimination • Neglect • Malnutrition
Gülay Ogelman (2016)	Determine the effect of emotion regulation strategies on resilience.	Turkey – 104 pre-school children (51% boys) of which 54 children whose fathers died in a mining accident.	*Resilience* • Children's Ego-Resiliency Scale (T) *Child behaviour:* • Child Behaviour Scale (CBS, T) • Peer Victimization Scale (T)	5-6y [?]	Teachers saw the bereaved pre-schoolers as less resilient and more excluded by their peers, yet also less victimized and more prosocial with their peers, compared to their nonbereaved peers.	*Direct measure*: • Father died unexpectedly. *Contextual adversity*: • Poverty
Gülay Ogelman (2021)	Comparison of resilience and peer relationships between children who lost their fathers and those who did not, rated by their teachers.	Turkey – 77 pre-school children (51% boys) from families with low socio-economic levels, with 35% being risky family environments.	*Emotion Regulation* • Scale of Emotion Regulation Strategies (C) *Resilience* • Children's Ego-Resiliency Scale (M/T)	5-6y [?]	Emotion regulation strategies were correlated with resilience scores in pre-school children, with an increase in emotion regulation leading to increased resilience scores. Also, the emotion regulation strategies had a predictive effect on children's resilience scores.	*Direct measure*: • No *Contextual adversity*: • Poverty

						• Domestic violence
Hildebrand (2019)	Investigation of the effect of domestic violence on resilience and mental health problems.	Brazil – 166 children (46% boys) and their guardians, of which 100 children that were victims of domestic violence, 66 children without reports of domestic violence	*Mental Health Problems* • SDQ (P) *Resilience* • Resiliency Scales for Children and Adolescents (RSCA; C) *Perceived Social Support* • Social Support Appraisals (SSA; C) *Family Environment* • Home Environment Resources Scale (HERS; P)	9-16y*	Children and teenagers with low levels of resilience may have an increased risk of mental health problems. Girls displayed a different resilience profile than boys. Adequate social and emotional support from a teacher or other community members can be a potential important protective factor, same with rules and routine imposed by guardians.	*Direct measure:* • Domestic violence (as assessed by social services) *Contextual adversity:* • Low SES
Jordan (2012)	Investigation of resilience in children of migrant workers.	Indonesia, the Philippines, Vietnam – 1,498 LBC* (49% boys) and their households, marked by migrant parents due to overseas labour.	*Family Functioning* • Adaptation Partnership Growth Affection Resolve (APGAR; P) *Caregiver Mental Health* • SRQ (P) *Well-Being outcomes (binary indicators)* • Happiness (C + P) • School Enjoyment (C) • School Performance (C + P)	9-11y	Children of migrant mothers report lower levels of happiness in comparison to non-migrant households. Prolonged maternal absence is linked to increased resilience. Parental migration does not have a direct effect on school enjoyment and performance. Differences in reporting were found between child and paternal reports on child resilience levels. Caregiver mental health has a bigger effect on children's well-being than parental absence.	*Direct measure:* • Parental labour migration *Contextual adversity:* • Poverty • Caregiver menta health problems
Massad (2009)	Examination of factors associated with resilience and vulnerability in children affected by war.	Palestine / Gaza Strip – 350 pre-schoolers (51% boys) from a region most adversely affected by political conflict and deprivation.	*Child Mental Health Status & Resilience* • SDQ (M/T) *Social Support* • Social Provision Scale (M) *Maternal Mental Health* • General Health Questionnaire (GHQ-28, M)	3-6y [59months]	About one-third of the children showed resilience, despite consistent exposure to violence. Children's deprivation and exposure to violence was associated with maternal mental health, instead of child mental health. This was explained as a limited variability of the violence exposure, with most children born and raised in these (chronic) adverse circumstances. Poor maternal mental health seemed to contribute to child vulnerability. The stress of a parent may be a more important link with child well-being than the child's experience of trauma.	*Direct measure:* • Exposure to violence (Gaza Traumatic Event Checklist) *Contextual adversity*: • Deprivation • Threat of relocation • Cumulative stress
Rojas-Ortiz (2019)	To determine baseline resilience and life skills characteristics for a health education programme for children, parents, and teachers.	Mexico – 239 children from Children's Wellness and Development Daycare Centers (EBDI. Pre-school; 47% boys)	*Institute of Social Security and Services of State Workers (ISSTE) in your School Program* • Resilience • Healthy nutrition • Mental and Emotional health • Knowing and taking care of my body • Social skills	Pre-schoolers	The implementation of a health education programme was able to boost pre-schoolers' health, by promoting resilience, empathy, assertive communication, interpersonal relationships, correct decision making, problem solving, creative & critical thinking etc. The programme successfully tried to increase the health knowledge in parents, teachers, and children.	*Direct measure:* No *Contextual adversity:* • Childhood obesity and overweight • Sexual abuse and physical violence against children

Roysircar (2019)	To explore how mothers' religious and nonreligious coping are related to child resilience and trauma adjustment.	Haiti – 42 children (36% boys) and their mothers that survived an earthquake.	*Resilience* • Focus group questions (M) – Qualitative • House-Tree-Person (HTP) test (C)	6-14y [8.83y]	Despite continuous trauma of extreme poverty, lack of access to resources, and high risk of natural disasters, mothers in Haiti were able to teach their children how to cope. Religion was the most important protective factor mentioned by mothers, with an increased importance of African humanism coping themes. Maternal sense of shame can be a risk factor to help children develop adequate coping skills.	*Direct measure:* No *Contextual adversity:* • Extreme poverty • High risk of child death • Lack of access to resources • High risk of natural disasters
Sharp (2018)	Investigation of school connectedness as a resilience factor in children affected by HIV/AIDS.	South Africa – 750 children (49% boys), of which 224 AIDS-orphaned children, 276 children orphaned by other causes and 250 non-orphans.	*Child Mental Health* • SDQ (C + P + T) *School Connectedness* • School Connectedness Scale (C) • School Support Scale (C)	7-11y [9.18y]	School connectedness can buffer against negative mental health outcomes, regardless of orphan status. Orphans reported lower levels of school connectedness than non-orphans, however, and girls reported lower levels of mental health problems. The results identified schools as important strategic points of intervention to build resilience in young children.	*Direct measure:* • Orphan status (verbal autopsy method) *Contextual adversity:* • Paternal HIV (death)
Wang (2019)	Examination of mediating effect of resilience on child neglect and social living ability.	China – 2397 pre-school children from a rural province in China, with 38.6% being LBC.	*Resilience* • Devereux Early Childhood Assessment (DECA, M) *Adaptive Functioning* • Infant-Junior Middle School Student's Ability of Social Life Scale (M)	6-72 months [36.6months]	Higher child neglect was causing lower adaptive behaviour, especially in 35-72 months old children (not so much in 6-35 months old children). Resilience mediates that effect slightly, although 67.2% of the children already show low resilience, thus the mediating effect is slim.	*Direct measure:* • Neglect (Child Neglect Evaluation Scales in Rural China, M) • Family Annual income *Contextual adversity:* • ?
Worku (2017)	Examination of the developmental, social-emotional, nutritional, and resilience status of SOS children.	Ethiopia – 62 SOS children** (52% boys) and 62 family-reared children (52% boys).	*Development Status* • Denver II-Jimma (C) *Social-Emotional Behaviour* • ASQ:SE (P) *Resilience* • Face-to-face interviews (S) – Qualitative	3.5-71.8m [44.6m/ 45.1m]	Orphaned children raised in a family-oriented setting exhibited resilient behaviour despite early life adversities. The SOS children demonstrated lower social-emotional development, language, and gross motor skills than their family-reared peers. Early intervention focusing on these specific factors are expected to be particularly beneficial for children raised in SOS villages.	*Direct measure:* No *Contextual adversity:* • Orphan status • Poverty • Undernutrition
Yang (2021)	Examination of the mediating role of resilience and the moderating role of self-	China – 380 LBC (57% boys) and their (female) teachers from 19 pre-schools. The region is	*Student-Teacher relationship* • Student Teacher Relationship Scale (STRS, T) *Resilience*	48-60m [4.88y]	Teachers can play a huge positive role in young LBC's lives. Resilience partly mediates that effect, with child self-concept as an important	*Direct measure:* • No *Contextual adversity:*

	concept on the associations between teacher-child relationships and social withdrawal.	known for its rapid economic development and influx of migrant workers.	• Devereux Early Childhood Assessment for Pre-schoolers (DECA-P2; T) *Child Self-Concept* • Adapted Pictorial Scale of Perceived Competence and Social Acceptance (PSPCSA, T) *Child Withdrawal* • The Pre-school children's Social Behaviour Scale (T)		moderating factor. Teachers need to be aware of this pivotal role in LBC's lives.	• Neglect • Lack of supportive home environment
Zhang (2021)	Evaluation of the relationship between emotion regulation and resilience.	China – 620 pre-school LBC* (52% boys) and their remaining family members	*Resilience* • Devereux Early Childhood Assessment for Pre-schoolers (DECA-P2; P/T) *Emotion Regulation* • Pre-school children's emotion regulation scale (C) *Family Functioning* • APGAR (C)	3-7y [55.2m]	This study with pre-school LBC highlighted the important role of emotion regulation, in addition to some family environmental factors, in the development of resilience. All six investigated dimensions of emotion regulation showed a consistent association with resilience and suggest that strengthening these dimensions can help prevent the adverse emotional development of LBC.	*Direct measure:* • Children left behind by parental labour migrants. *Contextual adversity:* • ?
Zhu (2023)	Examination of the moderating effect of resilience on the association between unsociability and social adjustment.	China – 148 pre-school migrant children (55%) from two public kindergartens in Shanghai (one of the most developed cities in China).	*Child Unsociability* • Child Social Preference Scale (M) *Resilience* • Children's Ego-Resiliency Scale (M) *Child behaviour:* • Child Behaviour Scale (CBS, T) • Social Skills Teacher Rating System (SSTRS, T) *Receptive Vocabulary* • PPVT (C)	[62.32m]	Resilience can mitigate the effect of unsociability on peer exclusion and interpersonal skills in migrant pre-schoolers. Among children with low levels of resilience, unsociability was positively associated with peer exclusion and internalizing problems. Children with higher levels of resilience showed no association between unsociability and social adjustment difficulties. The resilience of migrant children needs to be boosted.	*Direct measure*: • No *Contextual adversity*: • Child migration

Intervention studies

Author(s)	Aim	Study Population	Outcome Measures	Age Range [Mean]	Findings	Adversity
Eloff (2014)	Assessing the efficacy of an intervention to promote resilience.	South Africa – 390 mother-child (53% boys) pairs enrolled for this intervention study. The HIV-positive mothers and their children lived in two townships.	*Intervention:* • 24 weekly sessions – first 14 sessions mothers (topic: HIV information and skills for parenting) and children (topic: self-esteem, enhancing life skills) were in separate groups, thereafter combined (topic: healthy parent-child interaction) *Maternal assessment*	T1 [8.22y] – T4 [10.99y] (Data collection every 6 months)	This parent-child group intervention showed decreasing children's externalizing behaviour problems and increasing adaptive functioning (communication and daily living skills). These effects lasted at least 12 months after the intervention, with stronger effects for boys than girls on behavioural and depression scores.	*Direct measure*: • No *Contextual adversity*: • HIV/AIDS • Maternal illness • Poverty

			• Center for Epidemiologic studies - Depression Scale (CES-D, M) • The Brief Cope (M) • Parenting Stress Index (M) • Coping with Children's Negative Emotions Scale (CCNES, M) *Child assessment* • CBCL (M) • Vineland Adaptive Behavior Scale (VABS, M) • Child Depression Inventory (C) • Revised Child Manifest Anxiety Scale (RCMAS, C) • BarOn EQ-I emotional intelligence scale (C)			• Malnutrition
Gadari (2022)	To determine the effect of virtual resilience training on self-efficacy.	Iran – 77 primary school girls from an all-girls' school in Sotuheastern Iran.	*Intervention:* • 12 bi-weekly online resilience sessions via WhatsApp. Topics: self-awareness, problem-solving skills, responsibility, positive & negative thoughts/emotions, communication, friendship & making friends, relaxation exercises, and empathy. *Self-efficacy* • Children's Social Self-Efficacy in Peer Interaction Scale (C)	T1 [9-10y] + one month follow-up	The resilience training had enhanced the girls' social self-efficacy directly after the training and one month afterwards. These differences were significant from the control-group.	*Direct measure*: • No *Contextual adversity*: • Psychosocial harm • Pressure in society
Kummabutr (2017)	Examination of the effect of the Family-Based Life Skills Training Intervention on child resilience.	Thailand – 162 fourth graders (58% boys) and their parents from an area where floods had inundated the land 3 years prior.	*Intervention for children:* • Life Skills Training Program for Resiliency (LST-R) – 8 sessions. Topics: self-esteem, critical thinking, decision making and problem-solving, coping with stress, and self-regulation. *Intervention for parents:* • Parent Training Program for Developing Resilient Children (PTP-RC) – 1 session and homestudying. Focus: promoting and providing information on parenting skills and resiliency development for children at home. *Resilience* • Proactive Coping Inventory (C)	9-10y [?]	Children that followed the LST-R had an enhanced resilience, compared to the control group. This was partly attributed to the parental involvement. At 2 months after the intervention, LST-R children had decreasing resilience scores, with the control group showing increasing resilience scores.	*Direct measure*: • Natural disaster (flood) *Contextual adversity*: • Troubled family environments
Yazdanipour (2021)	To examine the effect of Group Theraplay on the social-emotional assets and resilience.	Iran – 27 children (52% boys) with moderate to severe hearing loss (wearing hearing aids before the age of 3).	*Intervention* • Group Theraplay (GT) – 10 weekly sessions of structured mother-child play therapy aimed to increase parent-child interaction, self-confidence, and child self-esteem. *Resilience*	5-6y [5.53y]	Group Theraplay promoted social assets and resilience in 5-6y old pre-schoolers, by promoting parent-child interactions and building self-esteem and peer-understanding and empathy.	*Direct measure*: • Hearing loss *Contextual adversity*: • Problems with communication,

			• Social-Emotional Assets and Resilience Scale for Pre-school (SEARS-Pre, M)			social skills, and empathy.

** LBC: Left-behind children, defined as children that have been left behind by at least one parent for > 6 months.*

*** SOS children: children living in an SOS children's village, a family-oriented and independent non-governmental organization.*

**** age range is 9-16, but findings have been divided up in different age ranges and we will only look at 9-10y*

C = Child, M = Mother, P = Parent/Caregiver, T = Teacher, S = Social Workers and Stakeholders

Table 3

Downs and Black Checklist for Quality Assessment of Longitudinal, Cross-Sectional, and Cohort Studies

		Bar	Ch-H	Ch-Q	Chr	Din	Don	Gül-16	Gül-21	Hil	Jor
Reporting (Max score: 9)											
1	Hypothesis/aim/objective clearly described	1	1	1	0	0	0	0	0	0	0
2	Main outcomes in Introduction or Methods	1	1	1	1	1	1	1	1	1	1
3	Participants characteristics clearly described	1	1	0	1	1	1	0	1	1	0
5	Principal confounders clearly described	2	2	1	0	2	2	0	2	2	0
6	Main findings clearly described	1	1	1	1	1	1	1	1	1	1
7	Estimates of random variability provided for main outcomes	1	1	1	1	1	1	1	1	1	1
9	Characteristics of participants lost to follow-up described	-	-	1	1	1	1	0	-	-	-
10	Probability values reported for main outcomes	1	1	1	1	1	1	1	1	0	1
External Validity (Max score: 2)											
11	Subjects asked to participate were representative of source population	UTD	UTD	UTD	0	0	1	UTD	UTD	UTD	UTD
12	Subjects prepared to participate were representative of source population	UTD	UTD	UTD	UTD	0	UTD	UTD	UTD	UTD	UTD
Internal Validity – I (Max score: 4)											
16	Any data dredging clearly described	1	1	1	1	1	1	1	1	1	1
17	Analyses adjust for different lengths of follow-up	-	-	1	1	1	1	-	-	-	-
18	Appropriate statistical tests performed	1	1	1	1	1	1	1	1	1	1
20	Outcome measures were reliable and valid	1	1	1	1	1	1	1	1	0	1
Internal Validity – I (Max score: 4)											
21	All participants recruited from the same source population	-	-	UTD	1	0	1	-	-	-	-
22	All participants recruited over the same period	-	-	1	1	1	1	-	-	-	-
25	Adequate adjustment for confounding	0	1	0	0	0	1	0	1	1	0
26	Losses to follow-up taken into account	-	-	UTD	1	1	1	-	-	-	-
TOTAL (Max score 19 or 14)		**11/14** Good	**12/14** Good	**12/19** Fair	**13/19** Fair	**14/19** Good	**17/19** Good	**7/14** Fair	**7/14** Fair	**11/14** Good	**9/14** Fair

Note: UTD: Unable to determine. Quality rating: for longitudinal and cohort studies: excellent (18-19); good (14-17); fair (10-13); and poor (≤9). For cross-sectional studies: excellent (13-14); good (10-12); fair (7-9); and poor (≤6).

Continuation of Table 3.

		Kos	Mas	Roj	Rot	Sha	Wan	Yan	Zha	Zhu
Reporting (Max score: 9)										
1	Hypothesis/aim/objective clearly described	1	1	0	1	0	1	1	1	1
2	Main outcomes in Introduction or Methods	1	1	0	1	1	1	1	1	1
3	Participants characteristics clearly described	1	1	0	1	0	1	1	1	0
5	Principal confounders clearly described	0	2	0	1	0	2	2	0	2
6	Main findings clearly described	1	1	1	1	1	1	1	1	1
7	Estimates of random variability provided for main outcomes	1	1	1	1	1	1	1	1	1
9	Characteristics of participants lost to follow-up described	1	-	-	1	-	-	-	0	-
10	Probability values reported for main outcomes	1	1	1	1	1	1	1	1	1
External Validity (Max score: 2)										
11	Subjects asked to participate were representative of source population	UTD	1	UTD	0	1	UTD	UTD	UTD	UTD
12	Subjects prepared to participate were representative of source population	UTD	1	UTD	UTD	UTD	UTD	UTD	UTD	UTD
Internal Validity – I (Max score: 4)										
16	Any data dredging clearly described	1	1	1	1	1	1	1	1	1
17	Analyses adjust for different lengths of follow-up	1	-	-	1	-	-	-	1	-
18	Appropriate statistical tests performed	1	1	1	1	1	1	1	1	1
20	Outcome measures were reliable and valid	1	1	0	1	1	1	1	1	1
Internal Validity – I (Max score: 4)										
21	All participants recruited from the same source population	1	-	-	1	-	-	-	1	-
22	All participants recruited over the same period	1	-	-	1	-	-	-	1	-
25	Adequate adjustment for confounding	0	1	0	0	0	1	1	0	1
26	Losses to follow-up taken into account	1	-	-	1	-	-	-	0	-
TOTAL (Max score 19 or 14)		**14/19** Good	**14/14** Excel.	**5/14** Poor	**13/19** Fair	**8/14** Fair	**12/14** Good	**12/14** Good	**11/14** Good	**11/14** Good

Note: UTD: Unable to determine. Quality rating: for longitudinal and cohort studies: excellent (18-19); good (14-17); fair (10-13); and poor (≤9). For cross-sectional studies: excellent (13-14); good (10-12); fair (7-9); and poor (≤6).

Table 4

Modified Downs and Black Checklist for Quality Assessment of Intervention Studies

		Elo	Gad	Kum	Yaz
Reporting (Max score: 9)					
1	Hypothesis/aim/objective clearly described	0	0	1	1
2	Main outcomes in Introduction or Methods	1	1	1	1
3	Participants characteristics clearly described	1	0	1	1
4	Interventions clearly described	1	1	1	1
5	Principal confounders clearly described	1	0	0	1
6	Main findings clearly described	1	1	1	1
7	Estimates of random variability provided for main outcomes	1	1	1	1
8	All important adverse events of the intervention been reported?	0	0	0	0
9	Characteristics of participants lost to follow-up described	0	0	0	0
10	Probability values reported for main outcomes	1	1	1	1
External Validity (Max score: 2)					
11	Subjects asked to participate were representative of source population	UTD	0	1	UTD
12	Subjects prepared to participate were representative of source population	UTD	UTD	UTD	UTD
13	Staff, places, and facilities representative	UTD	UTD	UTD	UTD
Internal Validity – I (Max score: 4)					
14	Attempt to blind study subjects to the intervention	UTD	UTD	UTD	0
15	Attempt to blind those measuring the main outcomes?	UTD	UTD	UTD	0
16	Any data dredging clearly described	1	1	1	1
17	Analyses adjust for different lengths of follow-up	1	1	1	1
18	Appropriate statistical tests performed	1	1	1	1
19	Was compliance with the intervention/s reliable	1	1	1	1
20	Outcome measures were reliable and valid	1	1	1	1
Internal Validity – I (Max score: 4)					
21	All participants recruited from the same source population	UTD	UTD	1	1
22	All participants recruited over the same period	UTD	UTD	1	1
23	All study subjects randomized to intervention groups	1	1	1	1
24	Was randomized assignment concealed from both patients & staff until recruitment was complete and irrevocable	UTD	UTD	UTD	UD
25	Adequate adjustment for confounding	0	0	0	0
26	Losses to follow-up taken into account	UTD	UTD	1	1
TOTAL (Max score 19 or 14)		**13/26** Fair	**11/26** Poor	**17/26** Fair	**17/26** Fair

Note. UTD: Unable to determine. Quality rating: for intervention studies: excellent (24-26); good (18-23); fair (12-17); and poor (≤11).

Table 5

Mixed Methods Appraisal Tool for Quality Assessment of Mixed-Method Studies

		Ebersöhn	Roysircar	Worku
	Qualitative (Max score: 5)			
1.1	Appropriate qualitative approach	1	1	1
1.2	Appropriate qualitative data collection methods	1	1	1
1.3	Adequately derived findings	UTD	1	1
1.4	Interpretation of results sufficiently substantiated	UTD	1	1
1.5	Coherence between qualitative data sources, collection, analysis, and interpretation	UTD	1	UTD
	Quantitative non-randomized (Max score: 5)			
3.1	Sample representative of target population	1	-	1
3.2	Appropriate measurements of both outcome and exposure	1	-	0
3.3	Complete outcome data	1	-	1
3.4	Accounted for confounders in design and analysis	UTD	-	0
3.5	Has exposure occurred as intended	1	-	1
	Quantitative Description (Max score: 5)			
4.1	Relevant sampling strategy	-	UTD	-
4.2	Sample representative of target population	-	1	-
4.3	Appropriate measurements	-	1	-
4.4	Low risk of nonresponse bias	-	UTD	-
4.5	Appropriate statistical analysis	-	1	-
	Mixed Methods (Max Score: 5)			
5.1	Adequate rationale for using mixed methods	1	1	0
5.2	Effective integration of different components	1	1	0
5.3	Adequate interpretation of the qualitative and quantitative outputs	1	1	UTD
5.4	Divergences/inconsistencies adequately addressed	1	1	UTD
5.5	Equal quality across methods	0	0	0
TOTAL		**10/15**	**12/15**	**7/15**

Note. UTD: Unable to determine.

2.2.4 Ethics

The study received ethical approval from the Faculty of Health Sciences HREC (Ref No 017/2020) and the department of Psychology (Ref No PSY2019-007) of UCT. The protocol for conducting this review was registered with the International Prospective Register of Systematic Reviews (PROSPERO; registration number CRD42020206447).

2.3 Results

The final literature search yielded 302 papers for full review, of which 28 papers were considered eligible for inclusion (see Table 2 for elaborate overview of authors, demographics, and study design of included papers). Interestingly, these 28 papers consisted of four longitudinal studies, four intervention studies, and 20 cross-sectional studies. There were three studies that had used a mixed-method approach, no purely qualitative studies were found eligible for inclusion.

There was one quantitative study that scored excellent on the quality rating (Massad et al., 2009), and two studies had a poor quality rating (Gadari et al., 2022; Rojas-Ortiz et al., 2019). The other 21 studies had a good or fair quality rating (see Table 3 & Table 4 for a detailed overview of the quality assessment). Of the three mixed method studies (see Table 5), the quality was higher for Roysircar et al. (2019) than for Ebersöhn et al. (2015) and Worku et al. (2018). This difference was mainly apparent in the integration of the mixed methods. Both Roysircar et al. (2019) and Ebersöhn et al. (2015) had an adequate rationale for using this design and they were able to effectively integrate both components, but last-mentioned had a poorer qualitative section rating.

Interestingly, a little less than half of the studies (13 out of 28) used a direct and quantitative measure for resilience – even though all studies said to be reporting on resilience as either a moderator, mediator, intervention, or outcome. Roysircar et al. (2019) and Ebersöhn et al. (2015) made use of a qualitative resilience measure and Worku et al. (2018) used face-to-face interviews with stakeholders in the community to assess resilience. There was one study that mentioned resilience in their title and throughout their study, but had no operationalisation included in their work (Jordan & Graham, 2012).

2.3.1 Adversity to Bounce Back From

To measure resilience, meant to also highlight where to 'bounce back' from (Masten, 2011). Table 6 provides a detailed overview of the direct and contextual adversities as reported by the included studies, with a specific focus on those adversities that are specific to LMICs because of their high prevalence (Walker et al., 2007, 2011).

2.3.1.1 Malnutrition

Eight studies reported on malnutrition as a risk factor for poor child development. Children with consistent access to food showed higher levels of resilience (Christodoulou et al., 2022; Rotheram-Borus et al., 2019), and healthy diets in early childhood were associated with better child outcomes (Worku et al., 2018). Interestingly, higher resilience levels were predictive of better dietary behaviour habits in pre-school LBC (Ding et al., 2022).

2.3.1.2 Exposure to Violence

Four out of seven studies that reported on exposure to violence did so whilst using a direct measurement. One surprising finding was reported by Barbarin et al. (2001), stating that community violence had a stronger influence than family violence (which was a direct contrast with findings from the USA). Resilience was only partly able to mitigate those negative effects. Parental stress related to violence exposure was a stronger influence on child wellbeing than the child's own exposure to trauma (Massad et al., 2009). Children that were exposed to domestic violence named teachers and community members as role models and safeguards that boosted their resilience (Hildebrand et al., 2019). The absence of intimate partner violence was also predictive of higher levels of child resilience (Donald et al., 2019; Rotheram-Borus et al., 2019).

2.3.1.3 Poverty

Fourteen studies mentioned childhood poverty as risk factor, with some interesting findings. Resilience in 5 year old children was associated with lower income in a community with already very low-income backgrounds (Christodoulou et al., 2022; Rotheram-Borus et al., 2019), which was contrasted with findings in a comparable community setting where resilience in 2 year old children was associated with relatively higher household income (Donald et al., 2019). Mothers in Haiti reported that their resilience was boosted and the negative effects of chronic poverty were reduced, when they believed that others prayed for them (Roysircar et al., 2019). Wealth was not a contributing factor to child well-being in LBC due to parental labour migration – indicating that material gains weren't a driving factor for child well-being in this context (Jordan & Graham, 2012). Economic status was of no influence on resilience development or child adjustment when children were faced with community or domestic violence, respectively (Barbarin et al., 2001; Hildebrand et al., 2019).

2.3.1.4 Maternal Mental Health / Positive Parenting

In the case of left-behind children and parental labour migration, which is common in LMICs, both Jordan & Graham (2012) and Zhang et al. (2021) reported on the importance of caregiver mental health (also reported by Donald et al. (2019), Massad et al. (2009) and Rotheram-Borus et al. (2019) without parental labour migration) and good family functioning. Good caregiver mental health had a bigger protective effect on children's well-being and resilience than parental absence. In other words, the (remaining) caregiver was able to buffer the negative effects by being emotionally present for their children and helping steer the emotion regulation of their children. Lack of emotional interactions or cognitive stimulating behaviour between mother and child was linked to lower levels of child resilience (Koshy et al., 2022; Wang et al., 2019), where sibling interaction was shown to have a

potential mitigating effect (Wang et al., 2019). Fuentes-Balderrama et al. (2020) highlighted the importance of positive maternal practices in relation to lower internalizing and externalizing problem behaviour in Mexican preadolescents.

2.3.1.5 Paternal HIV Status

Seven studies reported on maternal HIV status as adverse effect on child development. The stigma surrounding parental HIV was reported as especially detrimental for child resilience levels (Domlyn et al., 2020). Furthermore, the health risks associated with HIV status were key risk factors for child resilience (Christodoulou et al., 2022; Donald et al., 2019; Rotheram-Borus et al., 2019).

Table 6

Overview of the Direct and Contextual Adversities Reported in the Included Studies

Author	Malnutrition	Exposure to Violence	Poverty	Maternal Mental Health Parenting	Paternal HIV status	Other, non-specific to LMICs
Chen, Q (2021)						X
Ding (2022)				X		
Koshy (2022)	X		X			
Rotheram-Borus (2019)	X	X	X	X	X	
Barbarin (2001)		X	X			
Chen, H (2021)						X
Christodoulou (2022)	X	X	X	X	X	
Donald (2019)	X	X	X	X	X	
Ebersöhn (2015)	X		X		X	
Gülay Ogelman (2016)			X			
Gülay Ogelman (2021)			X			
Hildebrand (2019)		X	X			
Jordan (2012)			X	X		
Massad (2009)	X	X				
Rojas-Ortiz (2019)		X				
Roysircar (2019)			X			
Sharp (2018)					X	
Wang (2018)			X	X		
Worku (2017)	X		X			
Yang (2021)				X		
Zhang (2021)				X		
Zhu (2023)						X
Eloff (2014)	X		X	X	X	
Gadari (2022)						X
Kummabutr (2017)						X
Yazdanipour (2021)						X

2.3.2 Protective Factors That Boost Resilience in LMICs

One protective factor that stood out particularly for its representation in this LMIC context was (perceived) social support. As reported by Domlyn et al. (2020), perceived social support was an important psychosocial resource to mediate the effect of stigmatization on mental health in children dealing with parental HIV in China. Research by Hildebrand et al. (2019) added to that by stating that quality and perception of social support was associated with greater chances of high resilience. School and teachers were identified as major sources of protection for these Brazilian children, that were mostly victims of domestic violence. Not only teachers were identified as supportive, also other people in the community can perform as role models thus creating a social support network that is fundamental in protecting vulnerable children (Hildebrand et al., 2019). The important role of teachers was especially apparent in Chinese LBC, where they could potentially fill the role of 'caregiver' (Yang et al., 2021) and in Chinese preschool migrant children (Zhu et al., 2023). The importance of school in the lives of young children from LMICs is further demonstrated by Sharp et al. (2018). Feelings of connectedness to school can buffer against negative mental health outcomes in orphaned and non-orphaned children in South Africa. Children that felt a stronger bond towards school and had caring relationships in the school setting, showed lower levels of mental health problems. Especially in situations like ongoing conflict/war, social support is crucial (Massad et al., 2009). Perceived social support was also a positive influence at different stages in the development of Chinese primary school students without significant reported adversities (Q. Chen et al., 2021). Finally, Roysircar, Thompson, & Geisinger (2019) highlighted in their research the importance of family-parenting and community support for participants from southern Haiti. However, results here were conflicting when it came to community support. Half of the participants rated the support as beneficial to their coping, with sharing of resources as main support. Those that rated the

community support as limited, saw it as a detriment to their coping, and were most often nonchurch-goers. Nonetheless, these abovementioned studies showed that despite their young age, children in these disadvantaged contexts are already able to find important social support structures, especially when supportive family is not always a given.

In five studies, the important aspect of boosting emotion regulation to promote resilience was mentioned. Higher emotional understanding, regulation, and ability was linked with higher levels of resilience in pre-schoolers (H. Chen et al., 2021; Gülay Ogelman et al., 2016). Emotion regulation was able to mitigate the stress of life events to boost child well-being and resilience (Domlyn et al., 2020; Ebersöhn et al., 2015; Gülay Ogelman & Önder, 2021; Zhang et al., 2021) even when these young children (6years old) were already able to voice their knowledge of chronic risk and adversity in their direct upbringing (Ebersöhn et al., 2015).

A significant effect of age on child (socio-emotional) development was found in some studies; Donald et al. (2019) reported better developmental scores in older children of their sample, with other studies confirming this finding (Q. Chen et al., 2021; Fuentes-Balderrama et al., 2020). However, age had no significant effect on child development in other studies (H. Chen et al., 2021; Domlyn et al., 2020; Hildebrand et al., 2019; Sharp et al., 2018). Important to note that the age range for all studies was very different, and it was thus difficult to draw conclusions based on this information about the importance of age and positive socio-emotional development.

2.3.3 Resilience Over Time

Four studies had a longitudinal design. Of these, only two studies had multiple assessments of resilience (Q. Chen et al., 2021; Ding et al., 2022) and they showed with contrasting results. In pre-schoolers, resilience was not yet stable during a one-year time

period, four patterns were discovered: stable high, increasing, decreasing, and stable-low (Ding et al., 2022). In slightly older children, resilience seemed to increase over time (Q. Chen et al., 2021). This suggested that the different developmental stages that these children are in, have a unique effect on resilience.

2.3.4 Resilience as an Intervention

Another four studies employed an intervention design, with three studies aimed at boosting resilience using different life-skills interventions. A parent-child group intervention showed a lasting effect on children's resilience, with a stronger effect for boys than girls (Eloff et al., 2014). Another parent-child programme also showed promising results, with increased resilience scores for children right after the intervention, but decreasing resilience scores two months afterwards (Kummabutr et al., 2017). A group play therapy intervention was able to promote the mother-child interactions and build resilience skills in pre-schoolers with hearing loss (Yazdanipour et al., 2021). These studies showed the importance of including parents to boost child resilience. Finally, Gadari et al. (2022) were able to enhance young girl's social self-efficacy using a resilience WhatsApp intervention.

2.4 Discussion

The objective of this study was to investigate the extent to which protective factors that boost resilience in young, disadvantaged children from LMICs have been investigated. Because of the limited number of papers appropriate for inclusion, it is difficult to sum up which protective factors make the most impact on child development in LMICs specifically. There were numerous protective factors and outcomes researched, but more extensive research is needed to be able to have a clear-cut answer on specific protective factors for

children from LMICs, yet the most evidence seems to point towards boosting social support and emotion regulation in these vulnerable children, to enhance their resilience.

2.4.1 Limitations Derived From the Included Studies

An underreported factor in the included studies is the potentially positive influence of peer support on children in LMICs. Even though children have family as their first line of support (Engle & Black, 2008), if parental support is missing (which is the case for many of our investigated participants) they could potentially turn to peers and community support. Religion and belief systems can be important for perceived control and future outlook development, and to enhance the meaning in life and hope for your children (O'Grady et al., 2012). This potential mediating effect of religion in resilience is underreported in our included studies.

2.4.1.1 Resilience in the Context of Adversity

It is fundamental to not only describe the context of adversity when discussing resilience (Kolar, 2011), but also to measure whether the stress has made a significant impact. Most studies mention the adversities that children are facing, however, the majority of studies fail to include a direct measurement of adversities, let alone ask for a child's perception of their own trauma (understanding). They rather seem to assume that children are embedded in a generally adverse context due to chronic stressors of poverty and parental chronic illness, migration, or bereavement. The investigation of adversity is often done by looking at the cumulative effect of different risk factors over a (short) period. In the case of chronic adversity, adding a control-group and using longitudinal modelling of resilience for comparative research, can allow for different patterns of resilience to be investigated, in both at-risk and non-risk communities (Rotheram-Borus et al., 2019). Studies reporting on

adversity have the potential to highlight the dynamic nature of resilience and give in-depth information on which protective factors bolster resilience, rather than using resilience as an outcome. This is relevant in the context of LMICs, with different risk exposures and a wider variety of adversities compared to those from HICs (Brittain et al., 2015). There are simply more risks and challenges threatening the developmental trajectories of many children in LMICs. These differences are not only found on a cultural or societal level but also on a geographical level because of the high variation of resilience domains across different neighbourhoods within the same context of a LMIC (Rotheram-Borus et al., 2019), adding to the unique character of resilience research in LMICs.

2.4.1.2 Resilience From a Longitudinal Perspective

Despite the growing evidence and the often-mentioned theoretical explanations listing resilience as a dynamic process, only four studies reported on resilience longitudinally. The longitudinal perspective can help clarify when and how adaptation takes place using multiple timepoints to measure adversity and the protective factors that bolster resilience (Sleijpen et al., 2013). More frequent assessments during this period could have highlighted additional information from our included studies (like recurrent mental health problems, traumatic events to bounce back from, and signs of (mal)adaptation).

2.5 Conclusion

This scoping literature review tried to investigate which protective factors that bolster resilience could be identified and the extent to which this research had been done in LMICs in children under the age of 11 years. The main conclusion is that there remains a major paucity in data for this age-group and this subject, and especially when it comes to longitudinal studies. Even though the risks for this age group are amplified by its context, the

information regarding useful protective factors is very limited and varied. Especially regarding research in children under 11 years of age in a disadvantaged context, the developmental trajectories are highly influenced by external factors and a multitude of adversities (Collishaw et al., 2016). Children in this age bracket, especially 6- to 11-year-old children, must learn how to navigate a broader social environment. They are learning to socially adapt to peers, are starting to form social empathy, and need to adhere to stricter rules in school like learning, concentration, and discipline (Braet et al., 2014). If we take this into consideration, the current resilience research shows us only a small window of how the children in this age bracket are performing. The included studies showed that important factors to consider in future research are peer relations, religion, and social support - focusing on these factors, whilst taking a better look at trauma/adversities from a child perspective, would allow for more comprehensive resilience research for studies from LMICs. With an age-group (children < 11 years) that is underrepresented in the resilience research in a disadvantaged context (Theron et al., 2013; Ungar, 2004) developmental trajectories associated with pathways leading to resilience need to be uncovered.

Chapter 3 – A Bifactor Model of Childhood Adversity in A Longitudinal South African Birth Cohort Study

This chapter has been published online: De Leeuw, J.S.H., Lake, M., Gering, M., Hoffman, N., Donald, K.A., Zar, H.J., Stein, D.J., & Malcolm-Smith, S. (2025). A bifactor model of childhood adversity in a longitudinal South African birth cohort study. *Assessment, 0*(0). https://doi.org/10.1177/10731911251340221

Permission has been granted by the UCT Doctoral Degree Board to include the publication in my thesis.

3.1.1 Measuring Childhood Exposure to Adversity

Adverse childhood experiences (ACEs) refer to potentially traumatic events that occur before the age of 18, such as abuse, neglect, or exposure to violence, that require significant adaption by a child (Lacey & Minnis, 2020; McLaughlin, 2016). Early exposure to adversity can elicit a toxic stress response in children, hence the need to detect such exposure and screen for its impact to prevent future negative response and promote positive development (Oh et al., 2018). Toxic stress, when prolonged or intense, can negatively impact children's mental health and development, increasing the risk of long-term physical, emotional, and behavioural problems (Lewis et al., 2019). However, not all exposures to adverse events exert the same negative impact on mental health outcomes (Ellis et al., 2005). There are interindividual differences and child development can be impacted differently by deprivation or threat (McLaughlin et al., 2014) or for instance by physical or sexual abuse (Ellis et al., 2005).

Operationalisation of childhood adversity is predominantly done by either summing categories of adversity or by obtaining a total score that represents frequency, severity, and/or proximity of childhood adversities (Burgermeister, 2007; Cook et al., 2022), and seems less

focussed on the complexities of individuals' toxic-stress response (Lewis et al., 2019). ACEs like childhood maltreatment (sexual, physical, or emotional abuse) and exposure to violence, are consistently associated with a two-fold increase in the risk of common mental disorders and suicidality later in life (Sahle et al., 2021). Assessing childhood adversity is therefore crucial in understanding the impact on child health, since it should distinguish between adverse events that happen to a child and their stress response to these events (Boyce, 2016; Nelson et al., 2020) in order to develop strategies to break the intergenerational cycle of adversity and improve mental health outcomes worldwide (Sahle et al., 2021).

3.1.2 Moving Beyond the Traditional Adverse Childhood Experience Framework

The ACE framework has been instrumental in advancing our understanding of how childhood adversity impacts health and development (McLaughlin et al., 2014). However, the framework has significant limitations that constrain its utility for both research and practice (Lacey & Minnis, 2020). First, the summative approach to ACE scoring assumes that all adversities exert equal effects on outcomes, overlooking the unique contributions of specific adversities and the interactions between them (Lanier et al., 2018; McLaughlin et al., 2014), making it difficult to study the mechanisms through which adversities exert their effects, (Lanier et al., 2018). Second, traditional ACE frameworks often disregard the timing, chronicity, and discontinuity of adversities, treating them as static rather than dynamic processes (Howe et al., 2015; Slopen et al., 2014), making it difficult to investigate how adversities affect children differently at various developmental stages or across cultural and socioeconomic contexts (McLaughlin, 2016; McLaughlin et al., 2014). To address these gaps, we propose a novel conceptualization of childhood adversity that moves beyond summative approaches, the Adversity Exposure-Response Model (AERM). This framework incorporates

both shared and specific effects of adversities, accounts for individual differences in stress responses, and considers the broader developmental context.

3.1.3 Habituation and Desensitization in Risk Exposed Children

Children growing up in under-resourced communities in low-and middle- income countries (LMICs) are often exposed to a greater variety and multitude of risks, compared to children in HICs (Brittain et al., 2015; Stein et al., 2015). This highlights the need for specificity in identifying childhood exposure to adversity and especially to check for the exposures' subsequent impact (Lewis et al., 2019). Theories such as desensitization and habituation (Rankin et al., 2009) provide valuable frameworks for understanding the (lack of) emotional response in children.

For instance, when community violence is pervasive, desensitization theory posits that repeated exposure to community violence may diminish children's emotional and physiological responses to such events over time, potentially reducing the immediate negative impact of violence on self-regulation or other developmental outcomes (Draper et al., 2023). Similarly, habituation theory suggests that through repeated exposure, children may adapt behaviourally, becoming less reactive to violence in their environments (Rankin et al., 2009). These theoretical perspectives underscore the need for a more nuanced understanding of how exposure to adversity interacts with developmental processes, going beyond simply tracking the frequency of adversity to explore its cumulative and contextual effects (Oh et al., 2018).

While desensitization and habituation to violence have been well-documented in HICs, particularly concerning media exposure (Huesmann & Kirwil, 2007), there is a paucity of research exploring these phenomena in LMICs where real-life violence is rife (Ward et al., 2018). Understanding how children emotionally react and adapt to violence is therefore

essential, given the potential long-term consequences of diminished emotional response like lower social competence and emotion regulation difficulties (Bender et al., 2022).

3.1.4 A Comparison of Models to Foreground Hidden Adversity Dimensions

Social science researchers often work with multifaceted constructs that are measured with several subscales, each intended to measure a specific aspect of that main construct and interpretation happens through either creating a total score or looking at the subscale scores separately (F. F. Chen et al., 2012). A higher-order structure effectively captures how subdomains relate to a broader construct but since items do not load directly onto a general factor, it is limiting the ability to assess both shared and unique contributions of each domain (F. F. Chen et al., 2012). Research into ACEs showed that using a broad total score complicates differentiation between type, frequency, timing, and/or impact of adversity (Hamai & Felitti, 2022) and more advanced techniques were suggested to extricate the effects of these different aspects of ACEs on childhood well-being and any negative outcomes (Cooper & Nickodem, 2021; Decrop et al., 2024). One such technique is the bifactor model, often used in intelligence research (e.g. Gustafsson & Balke, 1993; Luo, Petrill, & Thompson, 1994) as well as in studies of internalizing and externalizing psychopathology (Markon, 2019) and personality disorder (F. F. Chen et al., 2012). A bifactor model suggests that in a multifaceted construct (a) there is a variability that is linked to a general factor, capturing what is common to all indicators, and (b) unique variance attributable to individual facets, representing their distinct contributions beyond the general factor (F. F. Chen et al., 2012; Markon, 2019). Recent research by Cooper & Nickodem (2021) demonstrated the utility of a bifactor model in studying childhood adversity. By incorporating multiple indicators of lifetime adversity into a multidimensional framework, their findings revealed two key insights: A general factor of adversity (e.g., overall childhood adversity) had strong

predictive utility, supporting the use of a single composite score in some contexts. Further, specific factors (e.g., violence exposure, perceived stress, duration of violence) provided unique, actionable information about particular outcomes, highlighting the importance of examining subscale scores where relevant. This aligned with other research supporting multidimensional models of adversity (Abravanel & Sinha, 2015; Myers et al., 2015) and underscores the bifactor model's capacity to balance simplicity and complexity (Cooper & Nickodem, 2021). By summarizing the shared variance across dimensions while retaining the distinct contributions of specific adversities, the bifactor model helps guide decisions about whether to prioritize total scores, subscale scores, or both when interpreting and applying measures (F. F. Chen et al., 2012). Applying a bifactor model to childhood adversity advances the field by offering a framework to study both the cumulative impact of violence exposure and the unique effects of the emotional response to violence. This, in turn, supports the development of targeted interventions and policies tailored to address both broad and specific challenges associated with adversity (Cooper & Nickodem, 2021; Decrop et al., 2024).

3.1.5 Childhood Adversity in High-Risk Communities

Childhood exposure to adversity, particularly in high-risk, under-resourced communities, is a critical area of research due to its profound and long-lasting impacts on mental health and developmental outcomes (Boyce, 2016; Nelson et al., 2020). Children in LMICs are estimated to be ten times more likely to be exposed to violence compared to their peers in HICs (Hillis et al., 2016). Exposure to violence, in particular, has been consistently linked to emotional distress responses, such as internalizing symptoms (e.g., anxiety and depression) and externalizing behaviours (e.g., aggression), which can significantly affect long-term mental health (Finkelhor et al., 2015; McLaughlin et al., 2014; Tsunga et al.,

2024). Prior studies suggest that emotional distress responses may serve as a key mechanism through which violence exposure impacts long-term outcomes (Evans et al., 2013; Margolin & Gordis, 2004). For instance, heightened emotional reactivity may exacerbate the risks associated with violence exposure, leading to persistent behavioural or psychological difficulties (Evans et al., 2013). Variations in distress responses may explain why some children show resilience while others experience significant impairment following similar exposures (Masten, 2011). Understanding these relationships is particularly important in LMICs, where the burden of poor mental health among children and adolescents is disproportionately high (Lund et al., 2018; Patel et al., 2016). Children that face these problems early on in life are often faced with long-term negative consequences for themselves, their family, friends, and their society at large (Cartwright et al., 2015).

This current paper tried to give a detailed assessment of childhood adversity by combining two instruments that measure (a) the child's exposure to (community) violence and concurrently (b) the child's emotional distress response after a traumatic experience. Both instruments are part of the measurements done in the DCHS, a multidisciplinary longitudinal birth cohort study investigating the determinants of child health in under-resourced communities outside Cape Town, South Africa (Zar et al., 2015). The DCHS is unique in that it is one of the first birth cohort studies globally to comprehensively investigate risk factors for child health (environmental, infectious, nutritional, genetic, maternal, and psycho-social; Stein et al., 2015).

3.1.6 Rationale

The DCHS provided a unique opportunity to create a model of childhood adversity by exploring the combination of a child's violence exposure and a child's emotional distress response. Since adversity is often assumed in research (Kolar, 2011), this study aimed to

specify adversity by creating and testing a new model of childhood adversity that builds on two established measures. We hypothesised that this would provide a specified assessment of childhood adversity for children in a high-risk context, by not only summing up a category of violence exposure but by also tracking trauma-related behaviours in children who have been exposed to violence to account for interindividual differences in stress response (Nelson et al., 2020). There is a need for research into the shared effects of ACEs and how these effects are interrelated to adequately capture the psychological distress symptoms experienced by a child (Decrop et al., 2024). A multidimensional model that incorporates both shared and specific effects of adversities can advance our understanding of how adversity impacts children and to inform the development of more precise and effective interventions (Abravanel & Sinha, 2015). Given the high covariance between exposure to violence and emotional distress, we hypothesised that a bifactor model would best fit the data (Evans et al., 2013). The following research questions were posed:

1. Can the underlying relationship between measured variables of violence exposure and emotional distress be identified to form a comprehensive measure of childhood adversity?
2. Can the structure that emerges from the combination of measures be confirmed with Confirmatory Factor Analysis to identify the relationship to overall childhood adversity?
    a. Is a bifactor model the best fit for the data?

3.2 Methods

3.2.1 Study Site and Setting

This was a sub-study of a larger, ongoing birth cohort study (DCHS). For more in-depth information on this multidisciplinary birth cohort study see Stein et al. (2015) and Zar

et al. (2015). For more information on the psychosocial measures included in the cohort, see Donald et al. (2018). Pregnant women from two primary health care centres (TC Newman and Mbekweni clinics) were invited to join the DCHS. These health care centres are set in two communities with different cultural backgrounds. For example, participants from Mbekweni predominantly speak isiXhosa as their first language whereas TC Newman participants mostly speak Afrikaans. Both abovementioned communities are stable, yet low SES communities (Stein et al., 2015) and the cohort can be considered representative of other South African and LMICs peri-urban communities/settlements.

3.2.2 Participants

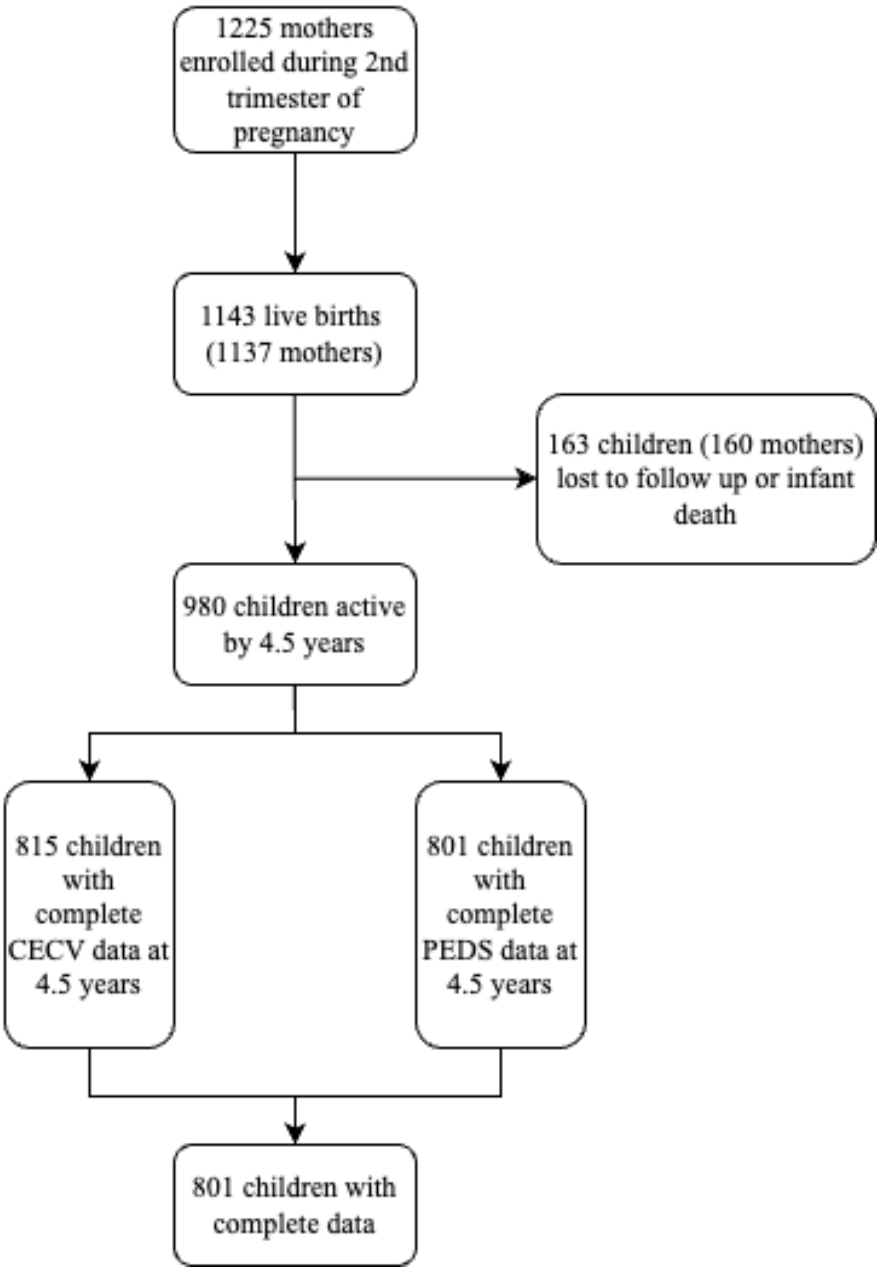
Enrolment began in March 2012 and ended in March 2015; inclusion criteria were women at least 18 years of age, that were planning to stay in the area for at least one year and planning to receive antenatal care at either of the two healthcare clinics. Mothers who consented were enrolled at 20–28 weeks' gestation and mother-child dyads have been followed longitudinally at several timepoints; currently the oldest children are 12 years of age (June 2024). At enrolment, mothers provided informed written consent (guided by local staff and in the mother's language of choice) and were further re-consented annually after childbirth. Mother-child dyads attended follow-up visits at the two clinics and Paarl Hospital (Stein et al., 2015). A total of 1137 mother-child dyads were enrolled in the study, with 1143 live births (4 sets of twins and one triplets). Due to attrition, the current sample in the DCHS is 980 (see Figure 5). Due to the late initiation of specifically the CECV and PEDS data collection during the first study visit (age 3.5), our current smaller sample size is smaller than the total DCHS cohort.

3.2.3 Procedure

The administration of both the CECV and the PEDS was done at the 3.5- and 4.5-year timepoints, and the measures were completed by the mothers or an eligible caregiver (living with the child and/or looking after them for 3 or more days per week). The administration was in the home language of the participants and conducted by trained research assistants from UCT. The measures were directly administered in Afrikaans for the Afrikaans-speaking participants and isiXhosa through the aid of interpreters for the isiXhosa-speaking participants, and English versions were available at all times. Both measures were translated using standard forward and back-translation processes, and consensus meetings were held including both communities to cross-check the translations to ensure the appropriate language and dialect was used. Study data were captured and managed using REDCap electronic data capture tools (Harris et al., 2009, 2019).

Figure 5

Flow Chart of DCHS Participation and Missing Data in Assessment of Childhood Adversity



3.2.4 Measures

3.2.4.1 Child Exposure to Community Violence

The CECV originally is a 39-item parent-report checklist, adapted from the widely used "Things I Have Seen and Heard Scale" that evaluates children's exposure to violence

(Amaya-Jackson, 1998). The questions contain information on the type and level of violence (domestic, school, community) that the child has witnessed or personally experienced (as victim or perpetrator). Higher scores indicate greater exposure to violence. The current version was adapted to fit the South African population more correctly, using examples of adversity that children in South African townships are exposed to, like home robbery, assaults, stabbings, and gun shootings (Fincham et al., 2009). Four items from the original scale were deleted, and certain wording was modified for cultural relevance and clarity. Notably, items measuring perpetration of violence (e.g., "Has your child ever hurt someone else badly?") and non-violence-related experiences (e.g., "Has your child ever witnessed drug deals in the community?" or "Has your child ever seen someone being arrested?") were excluded (Kaminer, Hardy, et al., 2013). Example items on the CECV include "Has this child heard gun shots?" and "Has anyone at home ever hit this child so hard they were hurt?". The answer possibilities were on a 4-point Likert scale (*"Never", "Once", "A few times", "Many times"*). The total score for the CECV was calculated by summing the 35 items, with higher scores indicating a greater exposure to violence (range 0-105). Mean scores have ranged from 13.71 (*SD* = 10.75, range 0-116) in young children (aged 3-5 years) in a South African township (Cook et al., 2022) to a score of 32.92 (*SD* = 20.72, range 0-156) in South African adolescents (Fincham et al., 2009). Within the adapted version of the CECV four subscales have been identified (Kaminer, Du Plessis, et al., 2013; Tsunga et al., 2023), namely, Witnessing Community Violence (10 items, α = .72), Community Victimisation (8 items, α = .75), Witnessing Domestic Violence (6 items, α = .75) and Domestic Victimisation (11 items, α = .79).

The CECV has shown good psychometric properties such as good internal consistency in previous South African studies, with α = .93 (Fincham et al., 2009) and α =.86 (Kaminer, Du Plessis, et al., 2013). In this study, the internal consistency of the CECV was

assessed using McDonald's Omega (ω). The omega total was found to be 0.73, indicating acceptable reliability (N = 815). To our knowledge, the CECV has only been used in one other study (outside of the DCHS cohort) to measure the exposure to community violence of South African children under the age of 10 years (Cook et al., 2022). The internal consistency of the total score was acceptable with a Cronbach's alpha of 0.72. The subscales (here described as three instead of four) demonstrated poor internal consistencies, with Cronbach's alphas of 0.64, 0.36 and 0.17 for CECV factors 1, 2, and 3, respectively (Cook et al., 2022).

3.2.4.2 Pediatric Emotional Distress Scale

The PEDS is a brief screening tool for behavioural consequences related to the occurrence of traumatic events during childhood and is completed by a parent (Saylor et al., 1999). The PEDS asks about the child's previous experience of a traumatic event and trauma-related experience of anxiety/withdrawal, fearfulness and acting out/externalising behaviours. There are three subscales: Anxious/Withdrawn (6 items, α = .74), Fearful (5 items, α = .72), and Acting Out (6 items, α = .78). The first part consisted of 17 items concerning general behaviour ("Does your child have bad dreams?" or "Does your child have temper tantrums?") with four answer possibilities ("*Almost Never*", "*Sometimes*", "*Often*", & "*Very Often*"). The total score for the PEDS was calculated by summing all the items (range 17-68) of part 1. The second part consisted of four trauma-specific items, yet only item 18 ("Has the child had a major trauma") has been included in the analysis for validity testing purposes. High scores on the 17 items (part 1) indicated a higher level of distress in the child. Mean scores on items 1-17 of the PEDS have varied greatly amongst research from as low as 21.9 (SD = 9.58, range 0-84; Saylor et al., 2003) and 25.7 (SD = 8.28, range 17-68; Coren et al., 2023) to as high as 52.3 (SD = 6.23, range 0-84; Bhushan & Sathya Kumar, 2009). Furthermore, factor structure analysis for the PEDS has shown different structures across studies (Cartwright et al., 2015;

Coren et al., 2023; Saylor et al., 1999). Recent research proposed a cut-off score at the 90th percentile as a guideline for emotional and behaviour difficulties that warrant further evaluation (Coren et al., 2023). A good reliability was found for the PEDS scale with a McDonald's omega (ω) of 0.87 (N = 803).

Research in a diverse sample with children 2 to 7 years of age showed that the PEDS is culturally sound and can be used in a variety of community contexts in the United States (Spilsbury et al., 2005). The total scale showed acceptable internal consistency, with a Cronbach's alpha of 0.80, and the two subscales used here (Internalize subscale and Act Out subscale) showed acceptable internal consistency too, with Cronbach's alpha of .80 and .82 respectively (Spilsbury et al., 2005) More recently, a study in the United States established nationally representative norms and percentiles for the PEDS (Coren et al., 2023). This study demonstrated a high internal consistency for the 17 core items (part 1), with a Cronbach's alpha of 0.92, and acceptable internal consistency for the subscales (Coren et al., 2023)

3.2.5 Ethics

Ethical approval was obtained from the Faculty of Health Sciences Research Ethics Committee, UCT (401/2009), and by the Western Cape Provincial Research committee (2011RP45). When significant health issues were identified by study staff, mothers and children were referred to local healthcare services for further assessment and management. Given the sensitive content of both measures, a key obligation in the study was to flag instances of abuse, trauma, and mental health issues. An active referral system was in place for both mothers and children supported by close relationships between study staff and provincial health staff. Furthermore, all women participating in the study, regardless of specific mental or physical health problems, were informed about social and support service providers available to them.

3.2.6 Data Analysis

Data analysis was performed using R Statistical Software (version 4.1.2) and R Studio (version 2922.07.1) for Mac (R Core Team, 2022). The Exploratory factor analysis (EFA) was applied with a maximum-likelihood estimator (MLR) and an oblique rotation (Oblimin) to allow for correlated factors. A range of factor solutions was tested, starting with one factor and progressively increasing the number of factors. The selection of the optimal factor solution was guided by (1) Eigenvalues: Factors with eigenvalues greater than 1.0 were retained based on the Kaiser criterion, (2) Scree Plot: The scree plot was inspected visually to determine the "inflection point," indicating where additional factors contributed diminishing explanatory variance, and (3) Theoretical Interpretability: Factors were evaluated for their conceptual relevance and alignment with theoretical constructs, and (4) Item Loadings: Items with loadings greater than 0.30 were retained (Field, 2009), and cross-loadings were monitored to ensure clarity in the factor structure. While both the CECV and PEDS have known subscales, prior studies have demonstrated variability in their factor structures across different populations and contexts (PEDS: Cartwright et al., 2015; Coren et al., 2023; Saylor et al., 1999, and CECV: Cook et al., 2022). We aimed to test whether the same variability was present in our dataset by first conducting EFAs for both measures separately. This allowed us to thoroughly examine item distribution and identify any patterns or inconsistencies specific to our sample. Using an exploratory-confirmatory approach ensured that our subsequent Confirmatory Factor Analyses (CFAs) were based on empirical evidence from our data, rather than solely relying on predefined structures, which may not fully align with the unique characteristics of our study population. CFA using Lavaan (Rosseel, 2012) was performed making use of full information maximum likelihood (FIML) estimation when handling missing values. Also, an MLR with robust standard errors using a numerical

integration algorithm was employed. The following goodness-of-fit indices were used to determine acceptability of the models/factor structures (cut-off scores are indicated in brackets): (a) chi-square (X^2) degrees of freedom (*df*), (b) the Tucker–Lewis index (TLI; .95), (c) the comparative fit index (CFI; .95), (d) root mean square error of approximation (RMSEA; .08), (e) standardized root mean square residual (SRMR; .08), and (f) the 90% confidence interval (CI; .08) of RMSEA and its significance (*p*; *p* .05; Schreiber, Nora, Stage, Barlow, & King, 2006). Additionally, the chi-square/*df* ratio ≤ 3 rule was also used (Kline, 2016). The factor structure identified through EFA was tested in CFA and compared against alternative models, as described below. The model with the best fit, as determined by the highest CFI/TLI and lowest RMSEA/SRMR, was selected:

Model of unitary dimension:

Model 1: One-factor CFA model (all items)

Models with subdomains:

Model 2: First-order CFA model (only subscales)

Model 3: Higher-order CFA model (subscales plus total score)

Model 4: Bifactor CFA model (subscales plus general factor)

The model with the best goodness-of-fit (i.e., highest CFI/TLI and lowest RMSEA/SRMR) was then selected. For the composite AERM score, total scores from the three PEDS subscales and the CECV scale were summed to reflect cumulative adversity exposure. Hierarchical models (and bifactor models in particular) tend to overfit the data, making comparisons of fit difficult (F. F. Chen et al., 2012; Markon, 2019). To account for potential overfitting of the data in the proposed models, total scores for each of the two individual measures were also included separately in the analysis to compare the best fit. Factor scores for the validity regressions were created using the standard Thurstone method, which

constructs regression-based scores by applying the factor loadings as weights to the observed variables. To assess the internal validity of the resulting factor models, we tested associations between factor scores for the CECV, PEDS, and AERM total scores and responses to PEDS 18 ("Has the child had a major trauma"). Examples of traumatic events include taxi accidents, house/shack burning down, loss of a parent/family member etc. This served as an external indicator of trauma-related behaviours, ensuring the constructs were relevant and interpretable.

To address missing data for the CECV and PEDS, imputation was performed using corresponding data from the 3.5-year timepoint to fill missing values at the 4.5-year timepoint, maximizing the sample size and improving robustness for analyses. Multiple imputation was conducted using the mice package in R, with models specified separately for the CECV and PEDS questionnaires, and including relevant sociodemographic variables (household income, maternal education level, and maternal employment level). For CECV, the number of participants with complete data increased from 745 (pre-imputation) to 815 (post-imputation), with 37 participants remaining missing all items, due to missing data at both timepoints. Similarly, for PEDS, complete cases increased from 57 to 803 participants after imputation, with 35 participants missing all items and 11 participants showing partial missingness (1 item). This imputation process, using a combination of both time points and resulting in an analytic sample size of 801 participants, substantially improved data completeness while maintaining transparency regarding unresolved missingness, ensuring the integrity of downstream analyses.

In under-resourced communities, such as those included in this study, violence exposure is pervasive, with approximately 75-80% of children exposed to multiple adverse experiences at a very young age (Tsunga et al., 2023, 2024). As a result, traditional cut-offs, such as those based on 4 or more adverse events commonly used in ACE studies, may not

adequately capture the severity of exposure in this context (Evans et al., 2013). Instead, the 90th percentile cut-off was selected to identify children with the most severe cases of violence exposure and emotional response, representing those at the highest risk of negative outcomes. The 80% cut-off has been used as a slightly more moderate option. Finally, a binary yes/no indicator of exposure to violence for each CECV item was created (cecv_binary) by collapsing the answer options “once”, “a few times" and “many times" to indicate “yes” to violence exposure and the rating “never” was retained as an indication of no exposure. This binary variable was used only for descriptive purposes and not in the main analyses.

3.3 Results

3.3.1 Descriptive Statistics

Table 7 shows sample characteristics for the 801 participants with completed PEDS and CECV data in the current sub study. The vast majority of children (88%) came from households with a monthly income below R5000 (272.57 US Dollar), with 50% of the mothers reported being employed, and 37% completed secondary education.

Table 7

Descriptive Statistics for the 4.5-Year Timepoint

Characteristic	***N* = 801**[1]
Maternal age at birth	26.0 (22.0, 31.0)
Child sex	
Female	400 (50%)
Male	401 (50%)
Child HIV exposure	

Characteristic	***N* = 801**[1]
HIV unexposed	632 (79%)
HIV exposed uninfected	167 (20.8%)
Infected	2 (0.2%)
Highest maternal educational achievement (2 levels)	
Lower than secondary	503 (63%)
At least secondary or higher	298 (37%)
Current parental employment	
not working	402 (50%)
Working	399 (50%)
Current household income	
<R1000/m	286 (36%)
R1000-5000/m	419 (52%)
>R5000/m	96 (12%)

[1]*Median (IQR); n (%)*

3.3.1.1 Child Emotional Distress Score

The mean score for the PEDS total score was 27.04 (*SD* = 7.11). In the original set of 801 observations at the 4.5-year aggregate time point, 7.74% of the participants had a score higher than 39 (the 90% cut-off score) on the PEDS. This percentage suggests a slightly lower rate of emotional disturbance compared to 5–6-year-old children in the USA (Coren et al., 2023). However, the 80% cut-off score (PEDS score >31) was met by 23.35% of the children in the DCHS, which suggests a higher rate of emotional disturbance compared to their USA peers.

3.3.1.2 Child Exposure to Violence

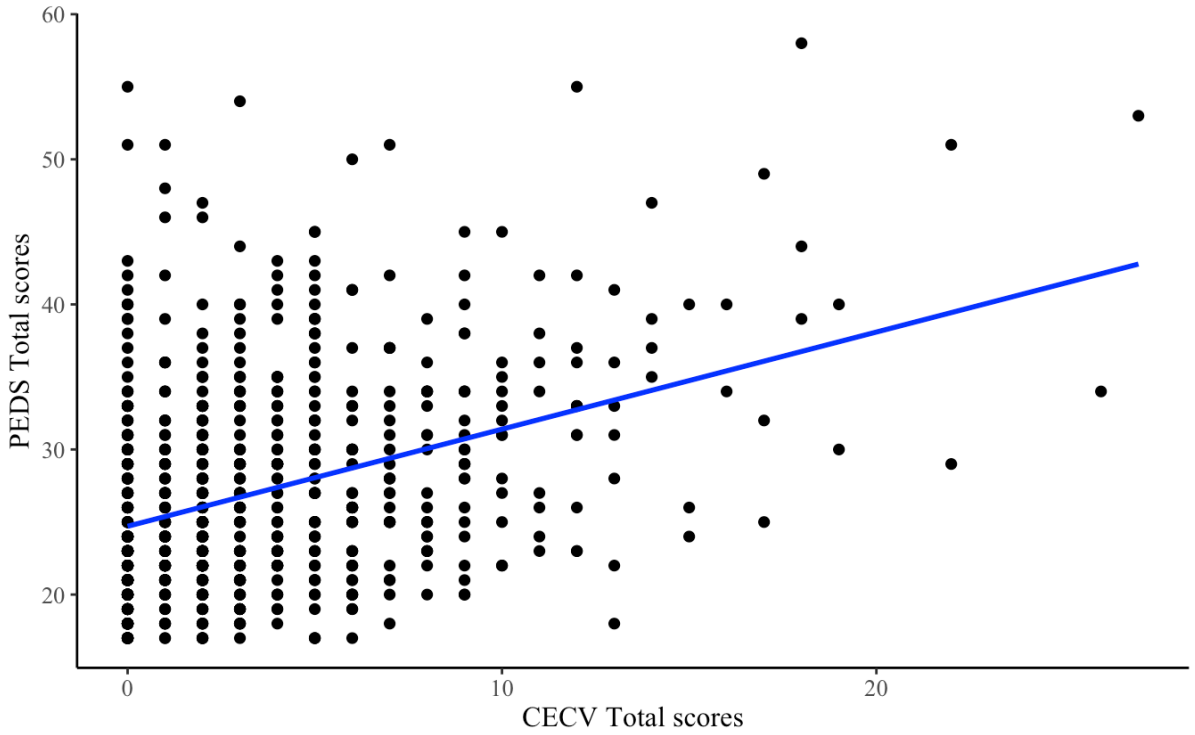
The mean score for the total score on the CECV was 3.46 (*SD* = 3.92). A 90% cut-off score on the CECV counts for a score higher than 8, which amounts to 10.61% of the 801 participants. This suggests that 10.61% of the children aged 4.5 years have been exposed to a multitude of violent events (community, domestic, or at preschool). A score of 6 or higher on the CECV amounts to the top 20% at the 80th percentile, which includes 21.60% of the participants. A binary yes/no indicator of exposure to violence for each CECV item was created. This resulted in 74.66% of the participants having experienced a form of violence at least once in their life at 4.5 years of age, which corresponds with other findings of the CECV (Tsunga et al., 2023, 2024).

3.3.1.3 Correlating the PEDS and CECV

To look at the correlation between the total scores on the PEDS and the CECV, a Pearson correlation coefficient was computed. This revealed a small but positive correlation between the two variables, $r(801) = 0.37$, $p < 0.001$. The 95% confidence interval ranged from 0.31 to 0.43. The small correlation suggests that there is some relationship between the total scores on the PEDS and CECV, but more in-depth analysis was needed. As shown in Figure 6, one of the reasons for the weaker than expected correlation between the two adversity measures is that at the lowest levels of CECV scores there is still a full range of PEDS scores, suggesting there is heterogeneity in the response to traumatic events.

Figure 6

Scatter Plot of the Relationship Between PEDS and CECV Total Scores.



Note: Blue line is a least squares regression.

A chi-squared test of independence was conducted to examine the relationship between the top 10% of children that experience emotional distress and the top 10% of children that experience exposure to violence. The analysis revealed a significant association between the two variables, $\chi^2(df=1, N=801) = 26.19$, $p < 0.001$. The effect size, as measured by Cramer's V, was found to be 0.18 which is considered a small-to-medium effect size. Practically, this means that while children with high exposure to violence are more likely to experience significant emotional distress, the relationship is not deterministic, as not all children exposed to violence report high emotional distress. This aligns with our earlier finding of heterogeneity in the emotional responses to traumatic events, as seen in Figure 6, where a full range of PEDS scores was observed even at the lowest CECV levels.

Interestingly, a chi-squared test of independence between the top 10% of children with emotional distress and the cecv_binary highlighted a non-significant relationship between these two variables, χ^2 (df = 1, N = 801) = 2.51, p = 0.1133. It showed that 52 out of 62 participants with high levels of emotional distress reported an exposure to violence, yet 10 out of 62 participants with high levels of emotional distress, reported no exposure to violence at all. The participants with both exposure to violence and emotional distress account for 6.49% of the sample (52/801).

Another chi-squared test of independence was conducted to examine the relationship between the top 20% of children that experience emotional distress and the top 20% of children that experience exposure to violence. This analysis also revealed a significant association between the two variables, χ^2 (df = 1, N = 801) = 30.28, p < 0.001. The effect size, as measured by Cramer's V, was found to be 0.19 and is considered a small-to-medium effect size.

3.3.2 Research Question 1

3.3.2.1 Exploratory Factor Analysis

Both the CECV (N=815) and PEDS (N=803) data were subjected to an exploratory factor analysis with oblique rotation (oblimin). First, the CECV data was entered and the maximum likelihood factor analysis with a cut-off point of .30 and the Kaiser's criterion of eigenvalues greater than 1 (Field, 2009; Werner et al., 2014) yielded a one-factor solution as best fit for the data, with 17% of the variance explained. This initial analysis was conducted using all CECV items, but it became clear that several invariant items did not contribute meaningfully to the factor structure due to their lack of variability. To get to the one-factor solution, 23 items for the CECV were deleted due to invariance as they showed no variability in responses, with a standard deviation of less than 0.1, leaving 10 items in this first analysis

(see Appendix D – Exploratory Factor Analysis of the CECV). These items were likely not endorsed due to the young age of participants and the specific contextual factors of the sample, such as reduced likelihood of exposure to certain adversities. The remaining 10 items primarily corresponded to the "Witnessing Community Violence" subscale, as identified in previous studies on the CECV (Cook et al., 2022; Kaminer, Du Plessis, et al., 2013).

All 17 items of the PEDS were entered and the maximum likelihood factor analysis with a cut-off point of .30 and the Kaiser's criterion of eigenvalues greater than 1 (Field, 2009; Werner et al., 2014) yielded a one-factor solution as best fit for the data, with 26% of the variance explained. Theoretically, a three-factor structure is suggested (Saylor et al., 1999; Spilsbury et al., 2005). This three-factor structure explained 36% of the variance in the current dataset. Interestingly, when examining the item distribution within the three factors, their structure was different than found in previous studies with the PEDS (Saylor et al., 1999; Spilsbury et al., 2005). See Table 8 for a comparison of the original PEDS factor structure and the current factor structure (see Appendix E – Exploratory Factor Analysis for the PEDS for a more detailed overview of the items per factor structure).

Table 8

Items for the PEDS in the Original Factor Structure and the Current Factor Structure.

Original Factor Structure			**Current Factor Structure**		
Factor 1 Acting Out	Factor 2 Fearful	Factor 3 Anxious/Withdrawn	Factor 1 Emotional Response	Factor 2 Fearful	Factor 3 Acting Out
1	3	6	1	**5**	**12**
2	4	7	2	**6**	**13**
11	**5**	8	4	7	14
12	**6**	9	**8**	9	**17**
13	**10**	14		**10**	
17		15		16	
		16			

Note. Items in bold match across factor structures

Finally, the remaining items for the CECV (10) and PEDS were merged to form the AERM with 27 items remaining (N=801). The Kaiser-Meyer-Olkin (KMO) measure verified the sampling adequacy of our merged dataset for analysis, KMO = .86 (meritorious). Bartlett's test of sphericity χ^2 (276) = 4703.22, $p < .001$ indicated that the correlation structure was adequate for factor analyses. The maximum likelihood factor analysis with a cut-off point of .30 and the Kaiser's criterion of eigenvalues greater than 1 (Field, 2009; Werner et al., 2014) yielded a two-factor solution as the best fit for the data, accounting for 27% of the variance. However, the scree plot indicated a four-factor solution, accounting for 34% of the variance, in line with the three factors for the PEDS and the one remaining CECV factor. In the final analysis with the merged data, 23 items remained (see Appendix F – Exploratory Factor Analysis for Merged Data). While a two-factor model initially seemed intuitive given that the combined EFA included items from two separate scales (CECV and PEDS), the four-factor model was ultimately chosen because it provided a better fit to the data and explained more variance. Importantly, the four-factor model ensured that the unique contributions of CECV items were not overshadowed by the larger number of items from the PEDS, thereby preserving the specificity of each measure within the combined structure.

3.3.3 Research Question 2

3.3.3.1 Confirmatory Factor Analysis

Four models were examined to assess their goodness-of-fit, (i) one-factor CFA model, (ii) first-order CFA model, (iii) higher-order CFA model, and (iv) bifactor CFA model. The results (see Table 9) showed that a bifactor model fits the data better than the other three models, suggesting that within the bifactor model there is a general factor (supposedly adversity) that is separable from the specific factors (Emotional Response, Fearful, Acting Out (PEDS), and Witnessing Community Violence (CECV)). The fit indices are acceptable

for the RMSEA (<.08), and SRMR (<.08), but inadequate for the CFI and TLI (<.95). Figure 7 shows the final fit for the bifactor model. Of note, some of the items in the bifactor model loaded weakly/moderately onto either the general factor or on their respective subscale, however, literature has not established cut-offs for acceptable factor loadings in bifactor models (Decrop et al., 2024; Reise et al., 2010). All but two items (CECV item 28; "Has this child known someone that was killed by another person?" and CECV item 30 "Has this child seen someone being killed by another person at home?") loaded significantly onto the general factor (see Appendix G – Confirmatory Factor Analysis for Merged Data).

Table 9

Fit of the Four Factor Models to the Adversity Exposure-Response Model

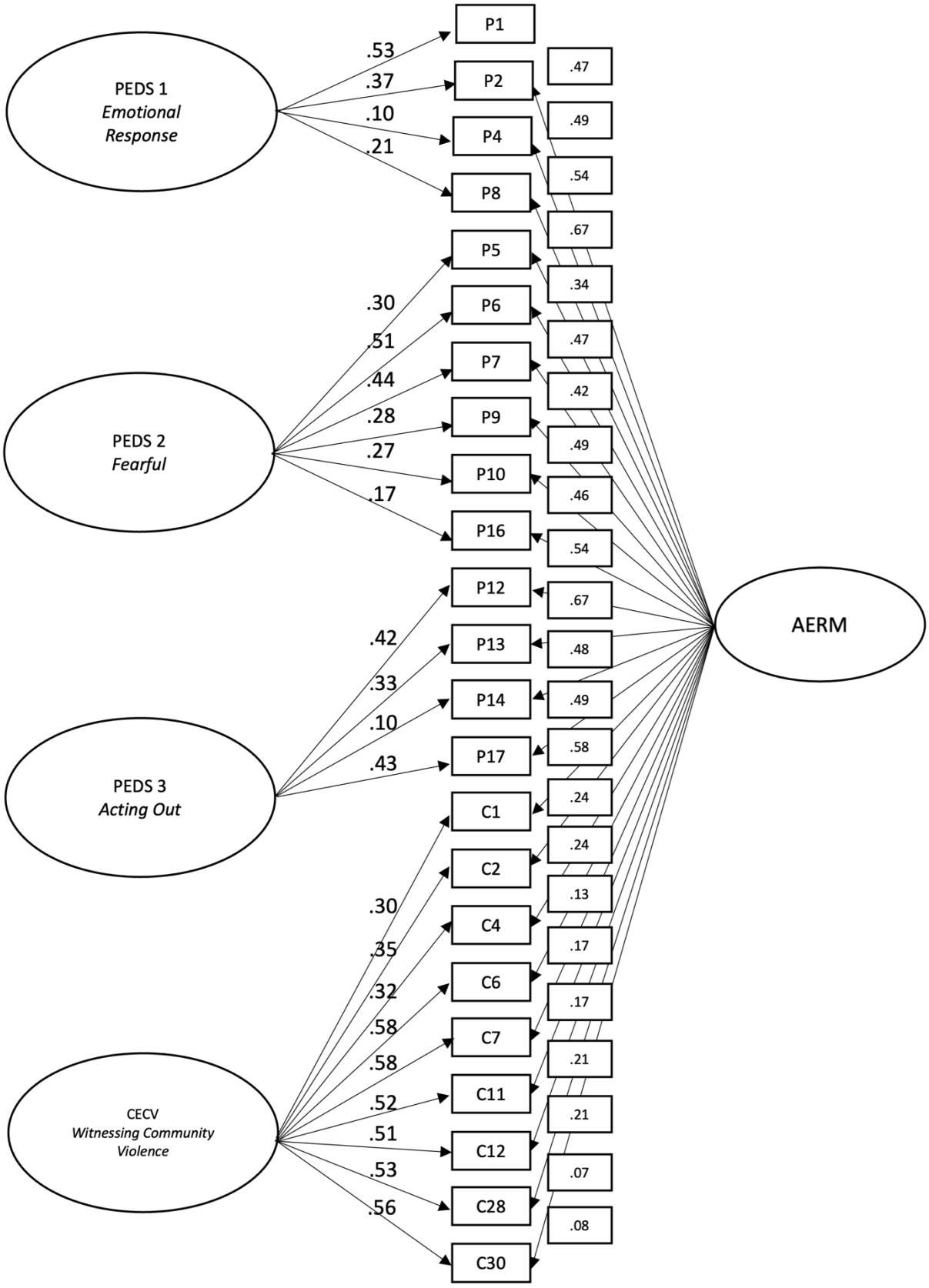
Model	X2	df	CFI	TLI	RMSEA	SRMR
(i) One-factor model	1251.10	230	.635	.599	.090	.090
(ii) First-order factor model	576.702	224	.888	.873	.051	.048
(iii) Higher order factor model	577.593	226	.888	.875	.050	.049
(iv) Bifactor model	545.315	207	.903	.882	.049	.042

Note. CFI = comparative fit index; TLI = Tucker-Lewis index; RMSEA = root mean square error of approximation; SRMR = standardized root mean squared residual.

A score for the AERM was formed by summing the total scores for the 3 PEDS subscales as well as the CECV subscale score. This variable ($\bar{x}$ = 5.15, *SD* = 2.58) showed strong correlations with the peds_total (r = 0.46, p <0.001) and cecv_total (r = 0.60, p <0.001) as well as with the PEDS subscales (r = 0.23, r=0.36, r=0.22 and p <0.001 for all), and the CECV subscale (r = 0.70, p <0.001). This is expected as it was aggregated from PEDS & CECV subscales scores.

Figure 7

Bifactor Model of the Adversity Exposure-Response Model With Factor Loadings per Item



3.3.3.2 Internal Validation of the Adversity Exposure-Response Model

To evaluate the relationship between item PEDS item 18 ("Has the child had a major trauma?") and the exposure to violence, a chi-squared test of independence was conducted. The analysis indicated a significant relationship between PEDS item 18 and CECV 90% percentile, χ^2 ($df = 1$, $N = 801$) = 26.61, $p < 0.001$. The effect size, as measured by Cramer's *V*, was found to be 0.18 and is considered a small-to-medium effect size. These findings provide support for the validity of the AERM by demonstrating consistent associations between emotional distress and increasing levels of violence exposure.

Children whose mothers reported "*yes*" on the trauma/stress item PEDS 18 ($n = 72$) were 2.67 times more likely to score above the 90% cut-off score on the PEDS compared to those children ($n = 729$) that did not report a traumatic event, 18.1% vs. 6.72%. This showcases strong internal validity, where children that have experienced a traumatic event had higher scores on the PEDS than those without maternal-reported trauma exposure.

Table 10

Correlations Between the Four Subdomains of the AERM

Variables	**PEDS 1**	**PEDS 2**	**PEDS 3**	**CECV**
PEDS 1 *Emotional Response*	1.00	<0.001	<0.001	<0.05
PEDS 2 *Fearful*	-0.24	1.00	<0.001	ns
PEDS 3 *Acting Out*	-0.19	-0.26	1.00	ns
CECV *Witnessing Community Violence*	0.08	0.04	0.04	1.00

Note. The bottom diagonal shows correlations, the top diagonal *p*-values

To conclude, three logistic regression models were fitted to examine the relationship between PEDS item 18 and various predictors, including (i) the factor scores for the three PEDS subscales (PEDS1-3) and the CECV factor, (ii) the total scores of the CECV and PEDS scales, and (iii) the AERM score (see Table 10 and Table 11 for results). Results

revealed that the total score on the CECV was a significant positive predictor (β = 0.15, p < 0.001), as was the total PEDS score, although its effect was negative (β = -0.01, p = 0.040). When examining the factor scores individually, PEDS factors 2 and 3 (Fearful and Acting Out, respectively) were significant predictors (β = 0.39, p = 0.022; β = 0.49, p = 0.010), alongside the CECV factor (β = 0.38, p < 0.001). Notably, the newly developed AERM score was also a statistically significant predictor of trauma exposure (β = 0.34, p < 0.001). These findings suggest that while individual scales and factors contribute unique information, the AERM effectively synthesizes this data into a robust metric for predicting trauma exposure.

Table 11

Different Potential Predictors of a Direct Measurement of Trauma Exposure

	Coefficient	**Std. Error**	**Z-value**	**P-value**	**AIC**
(Intercept)	-9.45	1.06	-8.88	<0.001	437.63
total_cecv	0.15	0.06	0.90	<0.001	
total_peds	-0.01	0.02	-0.241	0.040	

	Coefficient	**Std. Error**	**Z-value**	**P-value**	**AIC**
(Intercept)	-2.43	0.13	18.16	<0.001	468.84
PEDS1	-0.17	0.01	-1.43	0.022	
PEDS2	0.39	0.21	1.42	0.022	
PEDS3	0.49	0.20	1.77	0.010	
CECV	0.38	0.15	0.14	<0.001	

	Coefficient	**Std. Error**	**Z-value**	**P-value**	**AIC**
(Intercept)	-2.39	0.13	-18.48	<0.001*	470.76
AERM	0.34	0.08	4.18	<0.001*	

3.4 Discussion

This study aimed to form a comprehensive measure of childhood adversity, by combining the child's exposure to violence and emotional distress response. The main findings were 1) a bifactor model demonstrated a novel approach to measuring childhood adversity in a high-risk South African birth cohort study through the integration of two existing measures, 2) this bifactor model identified a general adversity factor that was able to predict direct trauma exposure in children, and 3) four subscales were identified, representing distinct dimensions of a violence exposure domain and emotional distress response domains.

The bifactor approach was useful in transcending the assumption that all adverse events result in uniformly negative outcomes, moving beyond the traditional ACEs framework. With results showing that almost 75% of the children were exposed to community violence, the percentage of children with reported signs of elevated distress was 8%, with 6.5% of the sample reporting high scores on both constructs. This heterogeneity in emotional responses to experience of trauma underscored the importance of combining the two measures, as it highlighted the variability in responses to similar levels of violence exposure. The AERM displayed exposure to community violence and levels of emotional distress response; hence it can account for interindividual differences in response. By explicitly linking exposure to violence with its emotional impact, the AERM provides a valuable contribution to the literature, illustrating how children process ongoing violence and reinforcing the need for assessments that account for both risk and resilience.

Consistent with prior studies (e.g., Abravanel & Sinha, 2015; Cooper & Nickodem, 2021; Myers et al., 2015), our findings underscore the multifaceted nature of ACEs. However, by using a bifactor model, we were able to identify a general adversity factor that provides a more comprehensive assessment of risk compared to using subscales or single measures alone. An important validity check for the use of the adversity composite is the fact

that it is a significant predictor of direct trauma exposure in children. The AERM reflects the cumulative burden of violence exposure and emotion distress response, aligning conceptually with the goal of measuring overall trauma exposure. This links back to the importance of a bifactor model, that in this case, hypothesises that there is one general factor that accounts for the commonalities across all childhood adversity variables - much like the “g” factor of general intelligence. The fact that all but two items loaded significantly onto the general factor, indicated that the CECV and PEDS have much in common.

While a two-factor model (CECV & PEDS) initially appeared logical, a four-factor model was ultimately selected for its superior fit and explanatory power. Although the bifactor model's fit indices were not exceptionally strong, they were significant and generally above the cut-off thresholds, making this exploratory approach justifiable in the context of developing a novel framework. Importantly, the choice for a four-factor model ensured the CECV items retained their unique contributions, rather than being overshadowed by the PEDS' larger item count, thereby preserving the specificity of both measures. Furthermore, as the PEDS is known to have a multifactor structure, the four-factor model captured this complexity, enabling a nuanced representation of distinct dimensions of violence exposure and emotional distress. This methodological choice strengthens the model's capacity to account for the multifaceted nature of childhood adversity.

When looking at the individual measures, the PEDS mean score ($\bar{x}$ = 27.04, *SD* = 7.11) was slightly higher than research into a national sample in the USA ($\bar{x}$ = 25.7, *SD* = 8.28; Coren et al., 2023). However, when comparing the age-group specific data (4.5y in the current dataset versus 5-6 years in the USA) the data was more or less the same ($\bar{x}$ = 27.04 in South Africa vs $\bar{x}$ = 27.5 in the USA). Interestingly, in our high-risk cohort, the percentage of children that scored above the 90% cut-off score was lower, which would indicate that fewer children are showing signs of emotional disturbance compared to their peers in the USA.

Younger children tend to score higher on the PEDS (Coren et al., 2023), even though they might not have been exposed to more trauma or stress, indicating that in young children, behaviour like bed-wetting, clinging to adults, or having temper tantrums is regarded normal and occurs more frequently.

Furthermore, the average child exposure to community violence was low ($\bar{x}$ = 3.46, *SD* = 3.92; range 0-105) indicating that the frequency of the exposure was low. This seems low compared to other research, for instance in young children in South Africa coming from the same age (3-5 years old) and high-risk background ($\bar{x}$ = 13.71, *SD* = 10.75, range 0-116; Cook et al., 2022). Yet, 75% of our young participants were exposed to at least one incidence of community violence in their young lives, which corresponds to other research in the same context (Cook et al., 2022; Tsunga et al., 2023).

The fact that children in the DCHS cohort were showing fewer signs of emotional disturbance despite reporting high rates of violence exposure was unexpected, given the high-risk areas these children grow up in and in general, South African children are exposed to disproportional violence levels (Meinck et al., 2016). Perhaps, the mothers in this cohort have (un)intentionally tried to minimize the reporting of their child's exposure to adversity (i.e. due to social desirability, since assessment was done via caregiver recall and report, and administered via in-person interviewers); some research showed that mothers tend to under-report on the frequency and severity of these adverse events (Fisher et al., 2011), especially when some of the questions are relating to their own parenting practices or are related to domestic violence.

The relatively low score for child violence exposure and emotional distress could also stem from a prolonged exposure to trauma – linking back to the theories of desensitization or habituation, with prolonged exposure to frequent and severe adversity leading children to normalize such experiences, reducing the perception of emotional disturbance in response to

these events (Kaminer & Eagle, 2010). This could explain the lower levels of reported emotional disturbance despite 75% of these 4.5-year-olds being reported having been exposed to a traumatic event in their young life at least once already. An alternative explanation can be that these results show post traumatic growth, even at this young age. This could be in line with the vulnerability paradox in posttraumatic stress disorder (PTSD; Dückers, Alisic, & Brewin, 2016), which states that greater country vulnerability is associated with decreased risk of PTSD for citizens, stating an important role for cultural and psychological factors beyond mere resource availability. Nonetheless, it is concerning that the vast majority of young children were exposed to traumatic events early on in their formative years and combined with heightened emotional distress, the potential association with PTSD or other behavioural problems seems obvious (Kaminer, Du Plessis, et al., 2013).

However, in the South African context, we also must not forget the extraordinary strengths displayed by so many children and their ability to adapt positively to ever-challenging circumstances. Future research should be directed towards uncovering protective pathways and factors that bolster resilience despite these adversities (Masten & Cicchetti, 2010). Within the context of the DCHS, this adversity model at the 4.5-year time point can be a critical element to understand the link between adversity and the subsequent child health outcomes.

3.4.1 Limitations

The results of this study must be considered within the context of some limitations. As mentioned earlier, since all information was gathered via caregiver reports, with a translator and/or research assistant present at time of assessment, it is not clear whether social desirability may have influenced the likelihood of accurate reporting. Only the items pertaining to the child's witnessing of community violence were included in the analysis, yet

the full CECV looks at different factors of violence beyond witnessing community violence (victimization of community/domestic violence and witnessing domestic violence). However, examination of these various types of violence exposures was unattainable due to the very low endorsement rates. Violence in the domestic context seems to be underreported, since an earlier report shows that 27% of the women reported exposure to intimate partner violence within the DCHS cohort (Barnett et al., 2022). This could be attributed to social desirability bias again or perhaps mothers underestimated the fact that the young children were witness to this domestic abuse.

Using the PEDS in a high risk/low income setting in an LMIC revealed notable differences in item distribution across its subscales (see Table 8). While the PEDS was developed to evaluate children directly after a traumatic event, this was not the case in the DCHS with a scheduled assessment regardless of child's exposure to trauma, which could have led to different answer patterns than in the context of acute trauma. A methodological limitation was that there is no information on the exact timing of the exposure to violence and emotional distress response, making a longitudinal analysis impractical which led us to opt for creating an adversity model.

Future research should aim to uncover why certain children showed high levels of emotional distress response without an exposure to violence, perhaps child temperament is of influence here. Furthermore, the correlation between the two measures was only of moderate effect, leading to a significant but not extraordinary strong bifactor model. The fact that most items were taken from the PEDS, could have impacted the adversity composite. Finally, gender and cultural differences is an important future direction of research, particularly given the potential influence of societal norms on emotional expression and experiences of adversity. However, given the exploratory nature of this paper and the lack of instruments

that accurately measure the multifaceted construct of adversity (Oh et al., 2018), any novel contribution should be welcomed.

3.5 Conclusion

This study demonstrates the successful development of a bifactor model for adversity, with a general adversity factor and four subscales each contributing uniquely to understanding childhood adversity. Instead of solely tracking frequency or severity of adverse events, the AERM combined exposure to community violence and emotional distress response. Given the potential long-term consequences of emotional distress, the AERM was able to provide valuable insight how children process emotional distress and responds to violence. Since research into childhood adversity often leaves out the emotion distress response, the AERM is providing a valuable contribution to the literature. Practical implications include the potential for early identification of at-risk children using a comprehensive adversity framework, which can guide targeted interventions in high-risk settings. Future research can investigate the applicability of this model to other cohorts and explore its association with outcomes such as resilience or externalizing/internalizing behavioural problems, to further study its utility.

Chapter 4 – A Longitudinal Study of Childhood Resilience in a South African Birth Cohort

4.1.1 Global Child Mental Health

Globally, mental health issues are a significant and growing concern; the World Health Organization (WHO) estimates that nearly one billion people worldwide (including almost 13% of 5-9 year old children and 14% of adolescents) suffer from some form of mental disorder (Institute for Health Metrics and Evaluation, 2021). Mental health issues are exacerbated by various factors such as social and economic inequalities, public health emergencies, war, and climate crises (Patel et al., 2023; Solmi et al., 2022). These conditions place a significant portion of the global population at risk, yet the availability of mental health services, skilled professionals, and mental health funding remain in short supply, especially in LMICs, and fall far below what is needed (Jaeschke et al., 2021). The access to mental health services is further limited by a lack of budget allocation within governmental health budgets, which is often less than 2% globally (Institute for Health Metrics and Evaluation, 2021). This underfunding contributes to an annual finance gap in global mental health support estimated to be at least $200 billion (United for Global Mental Health, 2022, p. 5). The onset of mental disorders often starts early, with almost half (48.4%) of affected individuals developing a mental health disorder before the age of 18 and 34.6% even before the age of 14 (Solmi et al., 2022). This calls for the promotion of good mental health, which is informed by research on protective and promotive factors that can positively influence developmental outcomes (Masten et al., 2021). One such example is the research into resilience.

4.1.2 Global Concept of Childhood Resilience

Leading researchers in the field operationalize resilience as the ability to adapt positively after exposure to significant adversity (Luthar et al., 2000; Masten, 2011; Rutter, 2012; Ungar, 2004). Resilience is best understood as a dynamic process rather than a static trait, with the ability to develop over time and to show variation across different developmental stages (Masten, 2014; Rutter, 2012; van Rensburg et al., 2019). This dynamic nature allows individuals to develop resilience through experiences, learning, and the cultivation of coping strategies that enhance their ability to bounce back from setbacks (Luthar et al., 2000). Resilience research represents a shift from merely focusing on the risks and potential adversities that individuals may face, to understanding and enhancing the factors and pathways that enable them to thrive and succeed despite challenges (Masten et al., 2021). Yet, stating that "*a person is resilient*" would be a misconception (Ungar, 2015), mainly because more in-depth information is needed when talking about the processes contributing to resilience. As indicated by Theron & Theron (2010), in resilience research it is no longer sufficient to merely list positive factors when conceptualising and defining resilience, but rather it is the processes leading up to resilience that need to be foregrounded. By focusing on identifying different developmental trajectories, a pathway model can explore certain experiences or factors in an individual's life that might promote resilience (Wright & Masten, 2015).

While there is growing recognition of the importance of resilience in early childhood, particularly in the face of adversity, comprehensive and longitudinal studies are relatively scarce compared to research on older children/adolescents or adults (Mesman et al., 2021; Zolkoski & Bullock, 2012). Global research on resilience in young children lags behind compared to other areas of developmental psychology and child psychiatry (Mesman et al.,

2021; Ungar, 2019). The complexity of resilience as a multidimensional construct necessitates more nuanced approaches and interdisciplinary collaboration to fully understand its development and impact in young children (Ungar & Theron, 2020). Therefore, while there is progress in the field, there remains a need for more robust and globally inclusive research efforts to inform effective interventions and policies that support resilience from early childhood onwards (Masten, 2014). Especially since factors that boost resilience in children are defined by the context, the population, and the risks, accentuating once more the dynamic nature of resilience (Fergus & Zimmerman, 2005). Studies suggest that early childhood experiences play a crucial role in shaping resilience, with supportive relationships and positive parenting identified as hugely important themes (Luthar et al., 2000; Masten, 2014).

4.1.3 Global Childhood Resilience Themes

Most reviews on resilience predominantly focus on (vulnerable) children in developed contexts in the Global North (Fogarty et al., 2019; Fritz et al., 2018; Masten, 2014; Yule et al., 2019). For instance, in a global youth resilience review, several common resilience boosting themes appeared: individual factors like emotional regulation, social skills, and confidence, parental factors such as support, monitoring, and communication skills, and community factors attributing special focus on positive role-models like teachers and after-school staff (Zolkoski & Bullock, 2012). Another systematic review further investigated which resilience factors were able to significantly reduce the risk of psychopathology after exposure to childhood adversity (Fritz et al., 2018), which in turn led to the identification of 13 individual-level factors, six family-level factors, and one community level protective factor (Fritz et al., 2018, p. 12). Yet, there has been a call for more focus on culturally

sensitive resilience research to foreground other resilience enabling themes in culturally diverse contexts (Theron et al., 2013; Theron & Theron, 2010; Ungar, 2013).

Global risk factors for poor developmental outcomes (like chronic economic hardship and exposure to violence) may also serve as catalysts for adaptive functioning in children growing up in high-risk environments, since children facing these chronic adversities have a lot to "bounce back" from (Ungar, 2013). The source for this adaptive functioning may lie in a different social value-system for LMICs, which tends to lean towards external locus of control, strong family ties, and spiritual/religious beliefs (Atilola, 2015). In her review on child and adolescent resilience in sub-Saharan Africa (SSA; excluding South Africa), Theron (2023) highlighted the importance of traditional African ways-of-being and -doing, linked to a sense of community, hospitality, and togetherness. A protective dyad of individual strength and affective support (a type of relational support that boosts psychological benefits) appeared to be the foundation of child and adolescent resilience in SSA, with relatively lower than expected emphasis on shared spiritual/cultural practices (Theron, 2023). Importantly, out of the 59 studies across 18 countries mentioned in the review, none reported on schools as a structural resilience enabler even though the potential of schools as mental health support sites in LMICs is evident (Fazel et al., 2014). More importantly perhaps is the notion that none of the 59 included studies (that mentioned the participants' age) focused exclusively on the resilience of children younger than 10 (Theron, 2023).

4.1.4 Childhood Resilience in South Africa

In their critical review of studies of youth resilience in South Africa, Van Breda & Theron (2018) found that resilience in South Africa is fostered by everyday themes (individual, relational, and cultural) similar to those in the Global North, highlighting that

resilience in South African youth is not uncommon. The resources needed to boost resilience that were of most importance to South African youth, as self-reported, were personal and relational resources (van Breda & Theron, 2018), a finding later confirmed in the review mentioned earlier for youth in SSA (Theron, 2023). Given that most participants experienced chronic structural disadvantage (i.e. poverty, growing up in under-resourced communities with limited service access), their access to cultural and structural resilience enablers was deemed to be very limited or rather 'invisible' (van Breda & Theron, 2018). Because of its unique cultural and contextual roots, more research on factors that boost resilience in South African children is needed (Theron & Theron, 2010; van Breda & Theron, 2018). Local work on what factors enable youth, and specifically children, to overcome challenges needs to be explored, as simply imposing ideas that stem from other contexts could lead to missing critical influences in South Africa's particular contexts (van Breda, 2017).

4.1.5 Global Adversity Exposure

As described earlier, one major component of resilience is a significant chronic or acute exposure to risk that needs to be determined from which an individual can "bounce back" (Ungar, 2015). Even though resilience can have different meanings over multiple contexts (Bonanno & Diminich, 2013), a crucial component seems to be the context of adversity, which must be identifiable (Goldstein & Brooks, 2013). Children nowadays face enormous challenges growing up: climate change, terrorism, war, economic inequalities, a recent global pandemic, and community violence have reached disproportional levels (Nelson et al., 2020). Childhood adversity has been defined as the experience of life events that negatively influence child development (Daniel, 2010). Exposure to these adverse childhood events can lead to short and long term negative consequences (Nelson et al., 2020). Unfortunately, reporting on childhood adversity is often done by solely looking at the

exposure to these negative life events and tracking the frequency, severity, and/or proximity of this exposure (Burgermeister, 2007). Yet, not all adversities have the same negative impact on children's mental health outcomes (Ellis et al., 2005) and not all trauma-exposed children for instance develop a mental health disorder (Lewis et al., 2019). Looking at psychosocial risks specifically (for example: neglect, threat, maltreatment, witnessing violence, extreme poverty), shows that each risk leaves their mark on a child's developmental trajectory in a complex way due to individual distress response differences, thus assuming that all children are equally affected by ACEs risks obscuring more nuanced effects (Lewis et al., 2019; McLaughlin et al., 2014; Nelson et al., 2020).

4.1.6 South African Child Adversity Exposure

In South Africa, children face disproportionately high levels of violence, coupled with pervasive structural disadvantages such as poverty, parental HIV, alcohol abuse, and poor housing conditions (Christodoulou et al., 2022; Meinck et al., 2016; Rotheram-Borus et al., 2019). A recent South African study in the DCHS cohort found that 83% of the children under the age of 5 had already been exposed to a form of violence (Tsunga et al., 2024). Despite this this alarmingly high rate of exposure, only 8% exhibited heightened emotional distress, with 6.5% showing distress specifically linked to exposure to community violence (see Chapter 3). These findings align with earlier research suggesting that, while violence exposure among South African children is widespread, there is often a normalization of violence due to its extreme prevalence (Kaminer & Eagle, 2010). Nonetheless, chronic and prolonged adversity, particularly when buffering protection from supportive adult relationships is absent, can trigger persistent stress responses in young children (Mcewen & Mcewen, 2017). The impact of such stress is shaped by multiple factors, including social context, individual experiences, and developmental timing, which underscores the heightened

sensitivity of young children to adversity (Shonkoff et al., 2020). In communities characterized by chronic adversity, such as under-resourced areas in South Africa, the normalization of trauma highlights the urgent need for more research into the psychological impacts and emotional distress responses in young children (Kaminer & Eagle, 2010). Despite the challenges, developmental research suggests that children exposed to early chronic adversity may exhibit adaptive abilities or 'hidden talents' within these harsh environments, these include enhanced attention and memory for stressful information, heightened creativity, and greater attunement to social relationships, enabling them to adapt to their ever-changing circumstances (Ellis et al., 2022).

4.1.7 Protective Factors and Processes Towards Childhood Resilience

Much research has underlined three highly correlated fundamental systems associated with boosting childhood resilience: individual capacities (such as self-regulation skills, cognition, temperament, social skills), caregiver capacities (psychological and physical caregiving), and a protective context (spiritual, educational, and cultural factors; Luthar et al., 2000; Masten, 2014; Ungar, 2011). These three systems all come into play in varying ways and moments, again attesting to the dynamic nature of resilience (Masten, 2014).

4.1.7.1 Individual capacities

In resilience research in children, individual capacities play a crucial role in enhancing their ability to adapt and thrive in the face of adversity (Masten, 2014). Children in the pre-school phase (3-6 years) are characterized by their developing sense of self, they learn basic problem-solving skills and how to engage in social interactions (Braet et al., 2014). At the same time, they are experimenting with their newly discovered temperament and are learning about emotional regulation, allowing children to manage their emotions and

maintain stability during difficult times which is an important resource to tap into in times of adversity (Bonanno, 2004; Polizzi & Lynn, 2021). Children with easy-going temperament and good regulation of positive emotions and enthusiasm tend to have higher levels of pro-social behaviour, which is linked with resilience (Rydell et al., 2003; Zolkoski & Bullock, 2012). Other aspects of temperament, like effortful control and positive affect can also potentially be linked to resilience (Eisenberg et al., 2010). A temperament characterized by positive affect, or the tendency to experience positive emotions frequently, is associated with better adaptive outcomes (Rothbart, 2007). Children with a positive affect are more likely to perceive challenges as manageable and to maintain an optimistic outlook, which can motivate them to persist in the face of difficulties and to use adaptive coping strategies (Eisenberg et al., 2010). These abilities are critical in forming supportive relationships, which are key protective factors that boost resilience (Hughes & Leekam, 2004; Masten, 2014). Furthermore, the development of empathy has been linked to children's growing social and cognitive skills such as emotion understanding and perspective taking and can be linked to the prosocial behaviour that is needed to boost resilience (Eisenberg et al., 2010; Taylor et al., 2013).

ToM is another important aspect of social cognitive development that can be linked to resilience in young children since children with well-developed social cognition skills are better equipped to navigate social relationships, understand social cues, and respond appropriately to the emotions and intentions of others (Hughes & Leekam, 2004). ToM, which is the ability to understand that others have thoughts, beliefs, desires, and perspectives different from one's own, typically becomes apparent around the age of 4-5 years, (Baron-Cohen, 2001). However, continuous research is needed to foreground a direct link between most of the above-mentioned individual capacities and resilience in young children in South Africa, since explicit research seems to be lacking (Theron, 2023).

4.1.7.2 Relational capacities

For immediate support, children turn to their primary caregivers since having at least one parent close by can reduce stress and trauma symptoms in case of acute adverse events (Masten & Narayan, 2012) and has protective effects on childhood development (Collishaw et al., 2016). As mentioned earlier, affective support is a crucial component of child and adolescent resilience in SSA (Theron, 2023). Mothers' social support and parental warmth can predict resilience in disadvantaged children, especially for children growing up in poverty (Kim-Cohen et al., 2004). A well-organized family and community can provide a sense of connectedness and stability, which can serve as a positive factor for children (Walsh, 2007). However, research linking maternal resilience with child resilience directly, seems to be a neglected concept (Gavidia-Payne et al., 2015). As children grow older, relationships with people beyond their parents become increasingly important (Braet et al., 2014) and especially their bond with friends and other adults (like teachers or local role-models) gain importance (Masten & Cicchetti, 2016).

Primary school aged children (6-12 years) are increasingly influenced by their peers, their social empathy skills are developing due to an increase in the complexity of their social environment, and their teacher has become another important role-model in their life (Braet et al., 2014). All the typical developmental milestones and progressions mentioned here can be compromised when there are acute and highly aversive events, that can be intensely distressing for children (Bonanno, 2004). Even though social skills and peer support are crucial elements of normal child development (Braet et al., 2014; Sciaraffa et al., 2018), there has not been a lot of focus on examining the protective value linked to childhood resilience (Masten & Cicchetti, 2016).

4.1.7.3 Contextual capacities

Finally, the role of community and social context can be crucial in the shaping of resilience in young children (Theron & Theron, 2010). For instance, neighbourhood characteristics like access to electricity and water, or having formal housing, may serve as a protective factor that boosts resilience in children growing up in poverty (Christodoulou et al., 2022). The negative effects of food insecurity and unsafe or informal housing can lead to poorer child outcomes (Nelson et al., 2020). Interestingly, lower maternal income and food security were associated with higher resilience in children growing up in a disadvantaged community ("*township"*) in South Africa, and maternal education level was not linked to child resilience (Rotheram-Borus et al., 2019). In the larger social context of a child, education, cultural practices and religion/spirituality have been named as important contributing factors to childhood resilience (Masten & Cicchetti, 2016; Ungar, 2013), yet this is not fully reflected in South Africa research, where contextual resources were less frequently reported as child and youth resilience factors (van Breda & Theron, 2018).

4.1.8 Rationale

The early onset of many mental health problems means that longitudinal research into protective factors that bolster development in (pre-)primary school aged children is crucial, especially in high-risk areas in LMICs. Yet, research into protective factors that boost resilience for children in this specific age bracket is lacking. These years lay the groundwork for positive trajectories of social and emotional growth that can influence child, adolescent, and adult mental well-being, making the lack in research even more poignant. The current study will serve as the first to use a longitudinal assessment of protective factors that bolster resilience in young children in a high risk setting in an LMIC. Research on factors that bolster resilience must include a clear measure of adversity, as children in under-resourced

South African communities grow up in chronically disadvantaged contexts (Masten, 2011). However, a significant gap remains in the scientific literature regarding the direct measurement of adversity when studying resilience (Yates et al., 2015). Moreover, longitudinal research underscores the importance of early intervention programs and nurturing environments in promoting resilience among young children, highlighting the potential for targeted interventions to mitigate the impact of early adversity (Luthar et al., 2000; Masten, 2014). Thus, understanding protective pathways that bolster resilience in young children involves recognizing the interplay of protective factors and risk experiences, paving the way for tailored strategies to foster positive developmental outcomes.

4.1.9 Research Questions

(1) How does resilience evolve over time in young children in a high-risk, low-income setting in South Africa?
    a. Which protective pathways can be uncovered by investigating individual, social, and contextual resilience?
(2) Is childhood adversity (exposure to violence and emotional distress) related to protective factors that boost resilience and to positive mental health over time?
(3) Do individual factors like child temperament, social cognition (both at 4.5 years), empathy, and emotion regulation (both at 5.5 years) moderate the protective effect of resilience on mental health outcomes?
(4) Do contextual factors moderate the protective effect of resilience on mental health outcomes?
    a. Does maternal resilience at 4.5 and/or 6 years moderate the protective effect of resilience on mental health outcomes?

b. Does household income, caregiver employment, and/or maternal education moderate the protective effect of resilience on mental health outcomes?
c. Does food security moderate the protective effect of resilience on mental health outcomes?

4.1.10 Hypotheses

(1) Adversity is expected to correlate positively with resilience.
    a. Higher levels of adversity could lead to higher levels of resilience, with more negative events to 'bounce back' from.
(2) A negative correlation between resilience and emotional and behavioural difficulties is expected.
    a. Higher levels of resilience are expected to be related to lower levels of mental health problems.
(3) Lower levels of temperament (emotional reactivity, impulsivity), and higher levels of effortful control are expected to strengthen the positive effect of resilience on mental health outcomes.
(4) Higher levels of social cognition are expected to strengthen the positive effect of resilience on mental health outcomes.
(5) Higher levels of empathy are expected to strengthen the positive effect of resilience on mental health outcomes.
(6) Higher levels of emotion regulation skills are expected to strengthen the positive effect of resilience on mental health outcomes.
(7) Higher levels of maternal resilience are expected to strengthen the positive effect of resilience on mental health outcomes.

(8) The literature is inconclusive about the effect of food security and household income on childhood resilience. A higher maternal education level and caregiver employment status are expected to strengthen the positive effect of resilience on mental health outcomes.

4.2 Method

4.2.1 Study Site and Setting

As discussed in more detail in Chapter 1 and Chapter 3, the current analyses were nested in the DCHS, a multidisciplinary birth cohort study investigating the early-life determinants of child physical and mental health in two peri-urban communities just outside Cape Town, South Africa (Stein et al., 2015; Zar et al., 2015). Biomedical, psychosocial, environmental, nutritional, genetic, maternal, and demographic risk factors are longitudinally measured. The study population is characterized by socioeconomic disadvantage and faces numerous psychosocial risk factors, including a high prevalence of single-parent households, psychological distress, exposure to violence, HIV, and substance use (Stein et al., 2015). The community also experiences significant rates of intimate partner violence, low employment levels, and limited educational attainment (Stein et al., 2015; Zar et al., 2015). Despite these challenges, the population is relatively stable, with minimal migration, and over 90% of residents rely on public healthcare services (Donald et al., 2018). Here I provide an overview of the methods relevant to the current study's objectives.

4.2.2 Participants

For a more detailed overview of the participants, see Chapter 1 and Chapter 3. A total of 1137 mother-child dyads were initially enrolled in the study, yet the total number of children enrolled in the study was 1143 since four mothers had twins and one had triplets. Due to attrition

the current sample in the DCHS is 980 (see Figure 8), with 487 with complete CYRM data at all timepoints.

4.2.3 Measures

4.2.3.1 Main Variables

4.2.3.1.1 Assessment of Childhood Resilience.

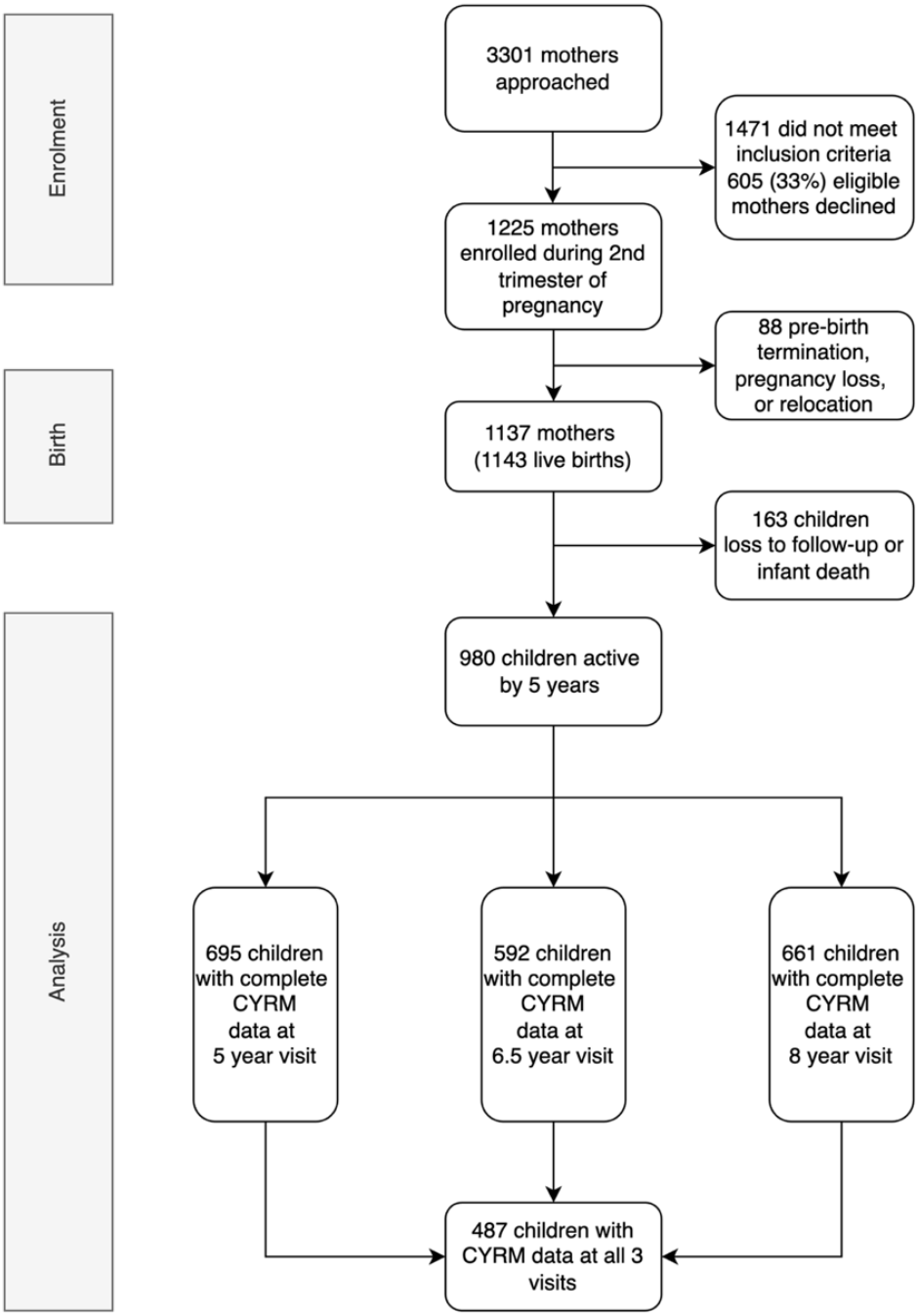
This study utilised the CYRM-26[2] (Ungar & Liebenberg, 2011). The CYRM-26 is a 26-item version, especially intended for children aged 5 to 9 years old and measures the individual's resources (individual, relational, contextual & cultural) that may reinforce their resilience (Ungar & Liebenberg, 2011). The questionnaire was originally designed for youth aged 9 to 23 years old but has been adapted for use in a younger age range. The data can be obtained through self-report or can be provided by a caregiver or someone else who is very knowledgeable about the participant's life. Within the DCHS, only primary caregiver/maternal reporting was available. Answer possibilities were on a three-point response scale ("*No*", "*Sometimes*", "*Yes*",). Eleven items made up the Individual scale which is focussed on personal skills (i.e., "Does your child cooperate/share with people around him/her?"), peer support (i.e., "Do you think your child feels supported by his/her friends?"), and social skills ("Does your child know where to go to get help?"). The Caregiver scale was aimed to assess the relationship with the child's primary caregiver, and it has seven items. There is a focus on physical caregiving (i.e., "Is there enough to eat at home when your child

[2] At the time of study inception for the DCHS, the CYRM-26 was widely used and considered best practice for assessing resilience. Since then, the CYRM-17 (Jefferies et al., 2019) has been recommended as a refined version, reducing the scale to 17 items, and consolidating it into two subscales. Preliminary exploratory and confirmatory analyses conducted across all three timepoints indicated that the CYRM-26 demonstrated better fit statistics than the CYRM-17. This discrepancy appeared to result from the exclusion of nine items to form the CYRM-17, which were found to have the highest variability at the item level. Based on these findings, we opted to retain the CYRM-26 for the analyses presented in this study, as it provided a more robust measure of resilience in this dataset.

is hungry?") and psychological caregiving (i.e., "Do you think your child feels safe when he/she is with you or his/her other caregiver(s)?"). The Context scale consists of three themes, corresponding with 8 items, with items asking about community (i.e., "Does your child think it is important to help out in his/her community?"), education (i.e., "Do you think getting an education or doing well in school is important to your child?") and cultural (i.e., "Do you think your child has people he/she wants to be like?") questions. Several South African studies have made use of the CYRM-26 to assess protective factors that support resilience in South African youth (Malindi, 2014; Theron et al., 2013) and it is considered a reliable and valid tool to assess these resources in children (Ungar & Liebenberg, 2011; van Rensburg et al., 2019) I used continuous scores (subscales and total) from the 5, 6.5, and 8 years timepoints for the analyses. Missing data for the CYRM was not a concern, as our multilevel modelling used Restricted Maximum Likelihood (REML), which incorporates all available data rather than requiring complete cases. For further details, see the Data Analysis section.

Figure 8

Flow Chart of DCHS Participation and Missing Data in Assessment of Childhood Resilience



4.2.3.1.2 Measure of Mental Health.

To check for mental health, and more specifically, emotional, and behavioural problems in children, the Strengths & Difficulties Questionnaire (SDQ; Goodman et al., 2007) was used. The SDQ is a brief behavioural screening questionnaire aimed for children between 3 and 16 years old to assess emotional and behavioural problems. It is an internationally well-validated screening tool (Goodman et al., 2007) that has been translated into many languages and extensively validated, including developing countries (Mullick & Goodman, 2001), such as South Africa (Cluver & Gardner, 2007). It consists of 25 items, asking about positive ("The child is kind to younger children") and negative ("The child is often argumentative with adults") attributes of the child, and is divided into five subscales with five items each; emotional symptoms, conduct problems, hyperactivity/inattention, peer relationship problems, and prosocial behaviour. The first four mentioned scales are added together to generate a total difficulties score, with higher scores indicating higher levels of emotional and behavioural problems. In the DCHS, only the maternal/caregiver version of the questionnaire was administered. The answer possibilities were "*Not True*", "*Somewhat True*" or "*Certainly True*" referring to the child's behaviour over the last six months. A low score on the SDQ indicated an absence of emotional and behavioural problems in a child. I used continuous scores for the SDQ total from both the 6.5 and 8 years timepoint.

4.2.3.1.3 Measure of Adversity.

As discussed in Chapter 3, a measure of childhood adversity is the AERM, which is a combination of the PEDS (Saylor et al., 1999) and the CECV (Amaya-Jackson, 1998). The use of the AERM allows for a comprehensive assessment of childhood adversity by integrating exposure to community violence with emotional distress responses. Rather than examining separate dimensions of adversity in isolation, the bifactor model captured the

shared variance across these experiences, reflecting a broader, underlying construct of general adversity. This approach accounted for individual differences in emotional processing and responses to violence, which are crucial for understanding developmental outcomes. In this study, I used the general adversity factor score from the AERM at 4.5 years, as it provided a more robust measure of adversity and was a significant predictor of direct trauma exposure.

4.2.3.2 Moderating Variables - Child Factors

4.2.3.2.1 Temperament.

Temperament was measured by using the ECBQ Very Short Form (Putnam et al., 2014), which is an abbreviated form of the validated 201-item ECBQ (Putnam et al., 2006). The Very Short Form was designed to give a general assessment of temperament in toddlers aged 18–36 months and was assessed retrospectively at 4.5 years. It includes 36 items, evenly divided across three factors: negative affect, surgency, and effortful control (12 items each). Negative affect encompasses emotions such as fear, sadness, anger, and discomfort. Surgency captures aspects of positive emotionality, activity level, impulsivity, and risk-taking. Effortful control reflects a child's capacity to regulate their behaviour by inhibiting or activating actions voluntarily. Parents rate the frequency of specific child behaviours on a scale from 1 (*Never*) to 7 (*Always*), with an additional option, "*Does not apply*," for items that may not be relevant to their child. In this study I used the three subscale scores with continuous scores for the analyses.

4.2.3.2.2 Social Cognition.

Social cognition was examined using 6 tasks from the UCT ToM Battery (Hoogenhout & Malcolm-Smith, 2014; Lindinger et al., 2016). This battery aimed to examine

the cognitive capacity to recognize and understand mental states of others and to predict their behaviour in young children through different child tasks (Baron-Cohen, 2001). The selected tasks were Unexpected Contents, Belief Emotion, Desire, Perception Knowledge, Diverse Desire, and Diverse Belief. The tasks were administered at 4.5 years. Previous research has shown that these tasks can be successfully used in a South African child research setting (Hoogenhout & Malcolm-Smith, 2014; Lindinger et al., 2016). In this study I used the average percentage score for the 6 ToM subtests.

4.2.3.2.3 Empathy.

The Questionnaire of Cognitive and Affective Empathy (QCAE; Reniers et al., (2011)) measures dispositional cognitive and affective empathy in the child. The scale comprised 32 items, with 17 measuring cognitive empathy and 15 measuring affective empathy. Participants respond using a 4-point Likert scale, with options ranging from "*strongly disagree*" (1) to "*strongly agree*" (4). The scale was developed based on several well-established and validated empathy questionnaire (Reniers et al., 2011). In this study, primary caregivers provided the assessments of their child's empathy at 5.5 years. An example item is “It affects my child very much when one of his/her friends seems upset”. The total QCAE score was derived by summing the two subscale scores, with higher scores reflecting a greater empathic disposition. The QCAE has shown broad applicability across different contexts (Kozloff et al., 2021) and has also been validated for use in the South African context specifically (Malcolm-Smith et al., 2024). In this study I used a continuous total score for the analyses.

4.2.3.2.4 Emotion Regulation.

Emotional Regulation was measured using parental ratings on the Rydell Emotion Questionnaire (Rydell et al., 2003) at 5.5 years. The 40 items assessing emotional reactivity evaluate how frequently and intensely the child exhibits four types of emotions: anger, fear, sadness, and positive emotions (exuberance). Emotional regulation is rated on a scale from 1 (strongly disagree) to 5 (strongly agree), with higher scores indicating greater reactivity or more challenges in regulating emotions. This tool demonstrates high test-retest reliability and has been validated against another rating instrument for children aged 5–8 years (Rydell et al., 2003). In this study I used only the total score as a continuous score for the analyses.

4.2.3.3 Moderating Variables – Relational Factors

4.2.3.3.1 Maternal Resilience.

The maternal resilience characteristics were investigated by the Connor-Davidson Resilience Scale (CD-RISC; Connor & Davidson, 2003) at 4.5 and 6 years. This scale was created to assess general resilience characteristics in adults and includes 25 items (e.g., "I like challenges"). Responses are rated on a five-point Likert scale, from 0 ("*Not True at All*") to 4 ("*True Nearly All of the Time*"). The ratings are combined to produce an average score ranging from 0 to 100, with higher scores reflecting greater resilience. The CD-RISC demonstrated strong reliability (Cronbach's alpha = 0.93) and shows good validity in relation to other measures of stress and hardiness (Connor & Davidson, 2003). However, when tested within different ethnic groups from the South African population further cultural validation appeared necessary (Jørgensen & Seedat, 2008). Nonetheless, the CD-RISC is one of the most widely validated scales in resilience literature (Campbell-Sills & Stein, 2007). It has been translated into many languages (Gucciardi et al., 2011) across a wide range of

populations with good cultural validation (Wang et al., 2010). In this study I used the total score as a continuous score for the analyses.

4.2.3.4 Moderating Variables – Contextual.

A questionnaire adapted from the South African Stress and Health (SASH) Study (Myer et al., 2008) was used to collect data on sociodemographic variables such as highest maternal educational achievement ("*Lower than secondary*" versus "*At least secondary or higher*"), current parental/caregiver employment status ("*not working*" versus "*working*") and average household income. This asked for the average over the past six months with three levels ("<*R1000/month*", "*R1000-5000/month*" and ">*R5000/month*"). The questionnaire was administered by trained study staff in interview format antenatally at 28 to 32 weeks' gestation and during annual study visits. Maternal education achievement was only assessed at 28 to 32 weeks' gestation. In this study I used binary (employment status) and categorical scores (household income) from the 4.5 and 6 years timepoint for my analyses, and the binary score from maternal educational achievement at birth.

Perceived food insecurity was assessed using an adapted version of the US Department of Agriculture Short Form Household Food Security Scale (Bickel et al., 2000) which captures food hardship due to financial constraints. Participants were asked specific questions about whether meals for children in the household were reduced in size, whether children skipped meals or experienced hunger, and whether they went a full day without eating due to financial constraints. These questions focused on children in the home as a conservative measure of perceived food insecurity, acknowledging that parents often shield children from food shortages, making them the last to experience food insecurity (Barnett et al., 2019). The scale included five items, with two or more affirmative responses indicating

food insecurity. In this study I used binary score (food secure or insecure) from the 4.5 and 6 years timepoints for my analyses.

Table 12

Overview of Included Measures in Longitudinal Resilience Study

Domain	Measure
Demographic data	
Maternal education level	SASH – Adapted version
Caregiver employment status	SASH – Adapted version
Household income	SASH – Adapted version
Food security	US Department of Agriculture Short Form Household Food Security Scale – Adapted version
Assessment of Childhood Resilience	CYRM-26
Assessment of Childhood Risk	AERM (CECV & PEDS)
Mental Health	SDQ
Child Factors	
Temperament	ECBQ Negative Affect
	ECBQ Surgency
	ECBQ Effortful Control
Emotion Regulation	Rydell Emotion Questionnaire
Theory of Mind	UCT ToM Battery with 6 subtests
Empathy	QCAE
Maternal Resilience	CD-RISC

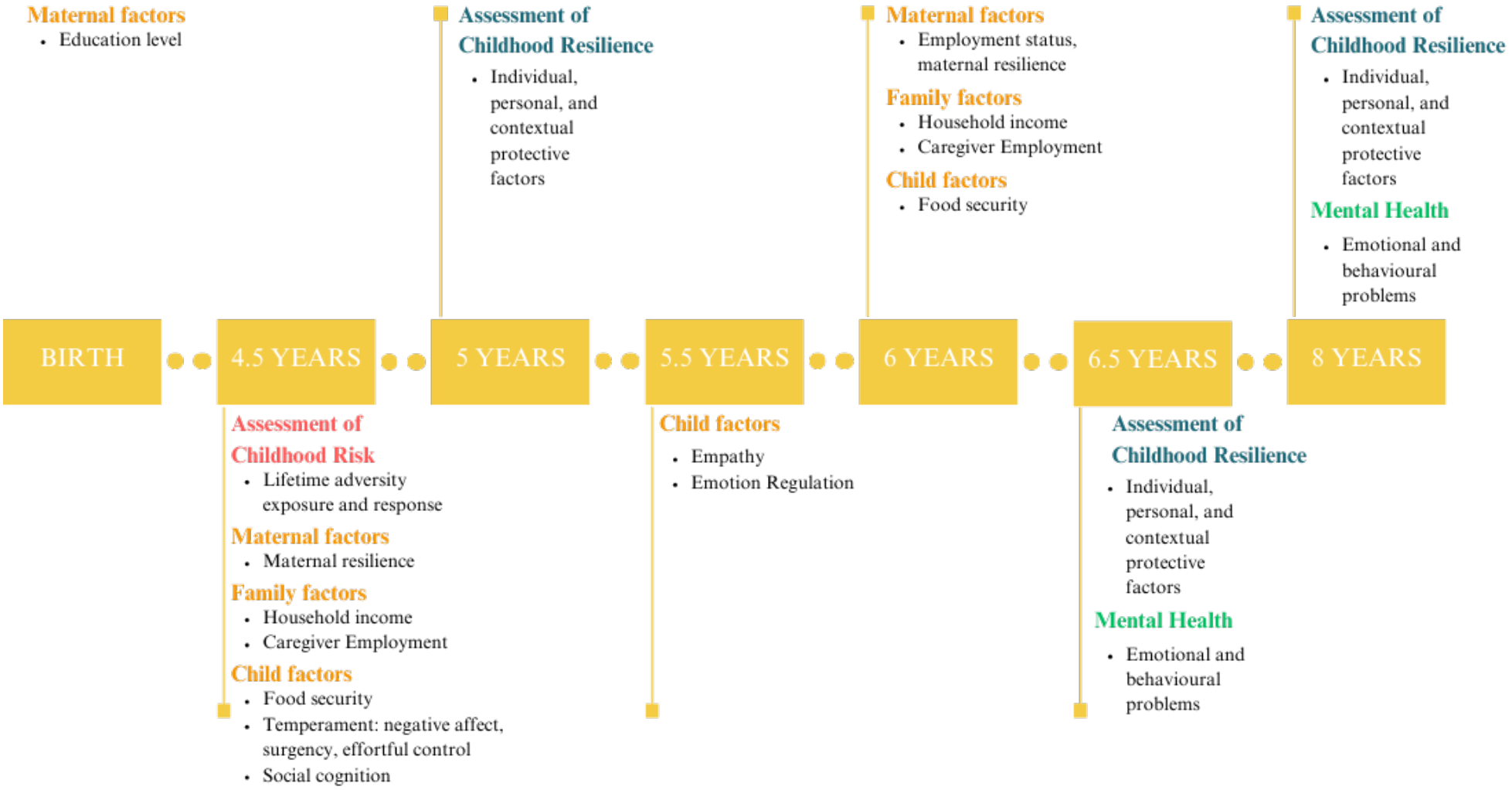
4.2.4 Procedure

The administration of the measures (see Table 12) was done at different timepoints (see Figure 9) and in the home language of the participants. The measures were completed by the mothers or an eligible caregiver (criteria: someone that lived with the child and/or looked after them for 3 or more days per week). Administration was conducted by trained research assistants from UCT. Measures were translated using standard forward and back-translation processes, and consensus meetings were held to cross-check the translations to ensure the appropriate language and dialect was used. For Afrikaans-speaking and isiXhosa-speaking

participants, the translated versions were used directly. Interpreters were present during isiXhosa administration to support comprehension where necessary, but they did not translate items in real time. English versions were also available. Study data were captured and managed using REDCap electronic data capture tools (Harris et al., 2009, 2019).

Figure 9

DCHS Assessment Timeline of Measures Included in Study



4.2.5 Ethics

As discussed in Chapter 3, ethical approval was obtained from the Faculty of Health Sciences HREC UCT (401/2009), and by the Western Cape Provincial Research committee (2011RP45) for the larger DCHS study. I was provided additional approval to conduct analyses using the DCHS data for this thesis by the Faculty of Health Sciences HREC UCT (017/2020). When significant health issues were identified by study staff, mothers and children were referred to local healthcare services for further assessment and management. Given the sensitive content of the assessment of childhood risk with the AERM, a key obligation in the study was to flag instances of abuse, trauma, and mental health issues. An active referral system was in place for both mothers and children supported by close relationships between study staff and provincial health staff. Furthermore, all women participating in the study, regardless of specific mental or physical health problems, were informed about social and support service providers available to them.

4.2.6 Data Analysis

Data analysis was performed using R Statistical Software (version 4.1.2) and R Studio (version 2922.07.1) for Mac (R Core Team, 2022). I used descriptive statistics to describe participants' demographic characteristics, resilience, mental health outcomes, and child, maternal and family variables. Cochran's Q-test was used to assess differences in CYRM cut-off scores, using median, binary, 90%, and 80% cut-off scores. Additionally, ANOVA was conducted to assess differences in CYRM total scores across timepoints. Multilevel modelling was performed using the lme4[3] and lmerTest[4] packages for R. A series of multilevel models were run to investigate the relationship between CYRM, AERM, and

[3] Bates, D., Maechler, M., Bolker, B., Walker, S., Christensen, R. H. B., Singmann, H., ... & Bolker, M. B. (2015). Package 'lme4'. convergence, 12(1), 2. https://github.com/lme4/lme4/
[4] Kuznetsova, A. (2015). Package 'lmerTest.' R Package Version, 0–2. https://github.com/runehaubo/lmerTestR

SDQ, while accounting for the nested structure of the data (i.e., repeated measures nested within participants). A first multilevel model was conducted to investigate the association between CYRM_total and SDQ_total over time, in addition to treating time as an interaction/moderation term to allow for the association to vary by age. The model tested associations as fixed effects, whilst a random intercept was included to account for individual differences in average SDQ_total level at baseline. This first model used the formula: *SDQ_total ~ TIME * CYRM_total + (1 | pid_child)*.

The second model included AERM as an additional predictor to test its main and interactive effects with CYRM on SDQ, to investigate the association between CYRM_total and SDQ_total over time. This model tested associations as fixed effects, whilst a random intercept was included to account for individual differences in average SDQ_total level at baseline, using the formula: *SDQ_total ~ CYRM_total * Total_adversity + (1 | pid_child)*.

The third model extended the analysis to the subscale level of resilience (CYRM), incorporating its three subdomains: Individual resilience, Caregiver resilience, and Contextual resilience. The model tested the interactions between AERM and each subscale in three separate models to investigate the association between the CYRM subscales and SDQ_total over time. This model tested associations as fixed effects, whilst a random intercept was included to account for individual differences in average SDQ_total level at baseline, with the formula: *SDQ_total ~ CYRM_individual_s * Total_adversity + CYRM_caregiver_s * Total_adversity + CYRM_context_s * Total_adversity + (1 | pid_child)*.

Finally, 15 additional models were run to explore moderators. Interaction terms between CYRM and each moderator were included to test for moderation effects, whilst a random intercept was included to account for individual differences in average SDQ_total level at baseline. All 15 models were run using Restricted Maximum Likelihood (REML)

estimation, allowing for the use of all available data instead of requiring complete cases for the CYRM. Fixed effects were tested using Satterthwaite's approximation for degrees of freedom. Post-Hoc analyses were conducted to assess model fit by assessing the Akaike Information Criterion (AIC) values for each model and the residuals were evaluated for normality and distributional assumptions using a histogram. Significant interactions were probed with the lsmeans package[5] and visualised with the ggplot package[6].

4.3 Results

4.3.1 Descriptive Statistics

Of the 980 participants currently enrolled in the DCHS cohort, 778 completed at least one of the CYRM assessments. Table 13 shows the maternal demographic characteristics collected at baseline (maternal education level), and further timepoints. Table 14 shows the descriptive statistics for the included child and maternal psychosocial variables.

Table 13

Proportion (Percentages) of Demographic Maternal Characteristics

Maternal Education Level at Baseline	**(*N*=778)**	
Primary & Some Secondary	488 (62.72%)	
Completed Secondary and any tertiary	290 (37.28%)	
Caregiver Employment Status	**4.5 years (*N*=776)**	**6 years (*N*=723)**
Unemployed	221 (28.48%)	228 (31.54%)
Average Household Income per Month	**4.5 years (*N*=773)**	**6 years (*N*=720)**
<1000 ZAR (62 USD)	140 (18.11%)	100 (13.89%)
1000-5000 ZAR (62 – 310 USD)	462 (59.77%)	397 (55.14%)
>5000 ZAR (310 USD)	171 (22.12%)	223 (30.97%)
Child-Referenced Food Security	**4.5 years (*N*=777)**	**6 years (*N*=726)**
Food insecurity	32 (4.19%)	61 (8.40%)

[5] Lenth, R., & Lenth, M. R. (2018). Package 'lsmeans'. The American Statistician, 34(4), 216-221.
[6] Wickham, H. (2006). An introduction to ggplot: An implementation of the grammar of graphics in R. Statistics, 1.

Table 14

Overview of Sample Characteristics

Variable	*N*	Mean	*SD*	Min	1st Q	Median	3rd Q	Max	Skewness	Kurtosis	*se*
Measure of mental health											
SDQ Total 6.5 years	509	13.6	5.26	5	10	13	16	35	0.86	0.99	0.23
SDQ Total 8 years	645	13.62	4.51	5	11	13	16	35	0.70	1.50	0.18
Measure of maternal resilience											
CD-RISC Total 4.5 years	760	87.35	15.6	20	78	92	100	100	-1.56	2.3	0.57
CD-RISC Total 6 years	597	74.94	25.24	0	61	82	96	100	-1.09	0.49	1.03
Temperament											
ECBQ Negative Affect	735	37.55	13.26	5	28	37	47	77	0.3	-0.5	0.49
ECBQ Surgency	735	66.47	10.69	14	60	68	74	84	-0.83	1.24	0.39
ECBQ Effortful Control	735	61.83	10.19	26	55	62	69	84	-0.28	-0.14	0.38
Emotion Regulation											
Rydell Total	575	110.06	14.03	71	101	110	119.5	151	0.13	0.05	0.59
Rydell Anger	575	26.66	3.86	16	24	27	29	38	-0.1	-0.11	0.16
Rydell Fear	575	26.06	4.46	15	23	26	29	40	0.07	-0.08	0.19
Rydell Positive Emotions	575	28.47	4.74	17	25	28	31	40	0.2	-0.34	0.2
Rydell Sadness	575	28.88	4.83	13	26	29	32	44	-0.08	-0.06	0.2
Empathy											
QCAE	571	87.78	15.51	42	78	90	100	118	-0.56	-0.2	0.65
Social Cognition											
ToM Total	536	65.82	14.71	13.83	57	66.67	75	100	-0.25	0.25	0.64

Note. *N* = sample size, *SD* = Standard deviation, Min = minimum score, Max = Maximum score, 1st Q = first quarter, 3rd Q = third Quarter, *se* = standard error.

Table 16 and Figure 10 provide an overview of the CYRM total scores and individual scores across the three timepoints. The internal consistencies of the CYRM total scores were evaluated across three time points: 5, 6.5, and 8 years. The CYRM demonstrated good internal reliability at each time point, with Cronbach's alpha coefficients of .853 at 5 years, .866 at 6.5 years, and .889 at 8 years. These results indicate that the CYRM reliably measures resilience within each time point.

The CYRM has three subscales (Individual, Caregiver, and Contextual), each of these factors score the lowest at timepoint 1. An analysis using ANOVA showed that for each factor the mean score at 5 years was significantly different from 6.5 years and 8 years (all p <.001), but no mean differences were found between 6.5 years and 8 years for any factor. A Pearson correlation was conducted to examine the relationships between resilience scores (CYRM) measured at three time points: 5, 6.5 and 8 years. The results indicated weak correlations between the scores at different time points (see Table 15). Ceiling effects were assessed for each timepoint by evaluating the percentage of participants who had the highest possible score with CYRM total (maximum = 52), indicating that 12.6% (5 years), 25.1% (6.5 years), and 35.2% (8 years) of participants had the maximum score for the respective timepoints (see Table 16 and Figure 10).

Table 15

Pearson Correlation Matrix for CYRM Total Scores Over Time

	CYRM at 5 years	**CYRM at 6.5 years**	**CYRM at 8 years**
CYRM at 5 years	1.000		
CYRM at 6.5 years	0.038	1.000	
CYRM at 8 years	0.115*	0.148**	1.00

* = p < .01, ** = p < .001.

Table 16

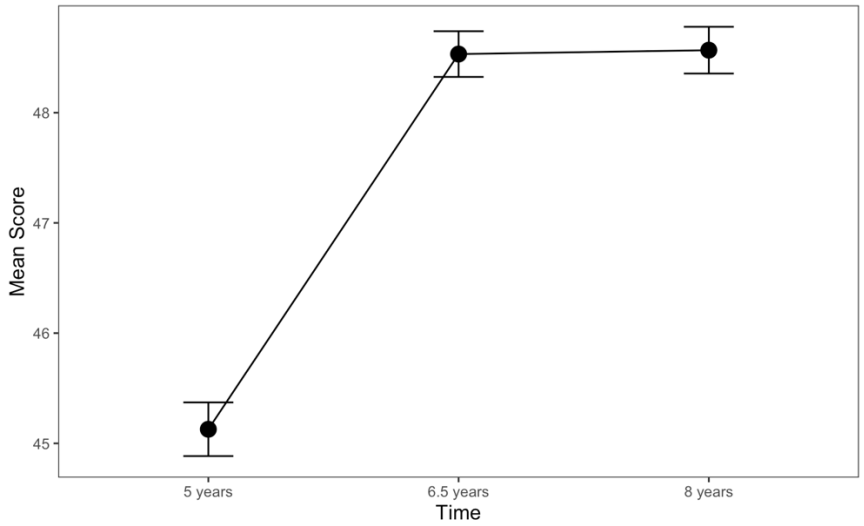
Overview of CYRM Total, Subscale Scores, and Characteristics Over Time

Variable	*N*	Mean	*SD*	Min	1st Q	Median	3rd Q	Max	Skewness	Kurtosis	*se*	Raw Alpha	Std Alpha
5 years													
CYRM Total	695	45.13	6.42	0	42	46	50	52	-2	7.82	0.24	.853	.870
CYRM Individual	695	18.31	3.28	0	16	19	21	22	-1.29	2.93	0.12	.726	.730
CYRM Personal	695	13.11	1.8	0	13	14	14	14	-3.15	13.19	0.07	.771	.775
CYRM Context	695	13.71	2.4	0	12	14	16	16	-1.48	3.45	0.09	.621	.643
6.5 years													
CYRM Total	592	48.53	5.05	3	48	50	52	52	-3.37	18.7	0.21	.866	.894
CYRM Individual	592	20.15	2.61	2	19	21	22	22	-2.47	8.85	0.11	.738	.779
CYRM Personal	592	13.44	1.33	0	13	14	14	14	-4.14	25.82	0.05	.737	.741
CYRM Context	592	14.94	1.71	1	14	16	16	16	-2.84	13.28	0.07	.601	.690
8 years													
CYRM Total	661	48.57	5.45	0	47	50	52	52	-3.73	23.01	0.21	.889	.912
CYRM Individual	661	20.19	2.68	0	20	21	22	22	-2.75	12.29	0.1	.766	.813
CYRM Personal	661	13.41	1.44	0	14	14	14	14	-4.31	27.81	0.06	.767	.781
CYRM Context	661	14.97	1.85	0	14	16	16	16	-3.37	17.64	0.07	.672	.727

Note. *N* = sample size, *SD* = Standard deviation, Min = minimum score, Max = Maximum score, 1st Q = first quarter, 3rd Q = third Quarter, *se* = standard error

Figure 10

Mean CYRM Total Scores Over Time

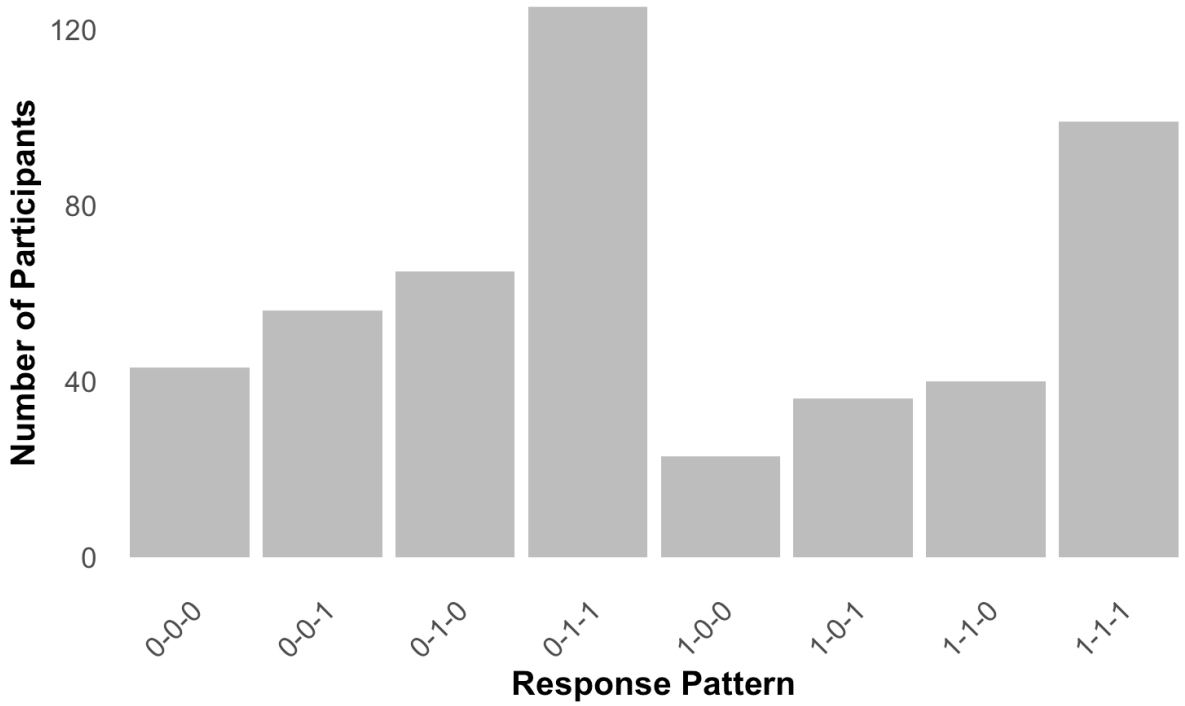


Previous research suggested that the CYRM does not have cut-off scores, but that contrasting of scores can be used to assess low versus high resilience. A Cochran's Q test was conducted to determine whether there were differences in binary CYRM scores across our three time points, using a median, binary, 90%, and 80% cut-off score. The results of the test indicated a statistically significant difference in proportions across the time points, $Q(2) = 90.591$, $p < .001$ using the median cut-off score. Post-hoc pairwise comparisons using McNemar's tests with Bonferroni correction revealed significant differences between Time 1 and Time 2 ($p < .001$) and Time 1 and Time 3 ($p < .001$), but not for Time 2 and Time 3 ($p = 1.00$). A pattern analysis was conducted to see if any participants changed between low versus high resilience groups over time, using the median threshold as cut-off score, see Figure 11 for the pattern analysis. Out of the 487 participants with CYRM data across all timepoints, 43 participants scored in the "stable low" group ("0-0-0") and 99 participants (19.9%) scored in the "stable high" group ("1-1-1") using the median cut-off score. Most of the participants had changing patterns over time however (345/487; 69.4%). See Appendix H

– Descriptive Analysis of the CYRM Total Score Using Binary Outcomes for an overview of binary cut-off scores and pattern analysis for the CYRM total score.

Figure 11

Response Pattern for CYRM Median Threshold Cut-Off Scores Over Time



Note. 0 = below median threshold score (<46), 1 = above median threshold score.

4.3.2 Multilevel Model 1: SDQ ~ TIME x CYRM

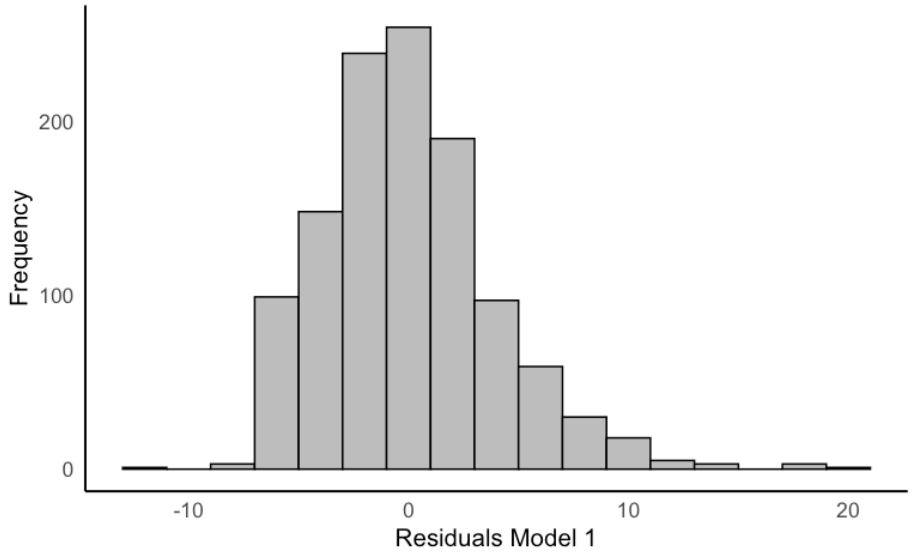
A linear mixed-effects model (N = 678) was conducted to investigate the relationship between CYRM and SDQ total scores over time, with a random intercept for participants. The model included fixed effects for time, CYRM, and their interaction (TIME × CYRM_total). The analysis revealed a significant main fixed effect of CYRM on SDQ scores, β = −0.184, SE = 0.040, t(1083.37) = −4.60, p <.001. This result indicates that higher CYRM scores were associated with lower SDQ scores. No significant main fixed effect of time (TIME) was observed, β = −2.871, SE = 2.517, t(1009.290) = −1.14, p = .254.

Additionally, the interaction effect between time and CYRM (TIME × CYRM_total) was not significant, β = 0.059, *SE* = 0.052, *t*(1012.08) = 1.14, *p* = .255. The random effects indicated variance within participants over time ($\sigma^2_{intercept}$ = 4.439, *SD* = 2.107) and residual variance ($\sigma^2_{residual}$ = 18.422, *SD* = 4.292). The AIC value for Model 1 was 6852.3 (see Table 18).

The residuals of the linear mixed-effects model were examined to assess the assumption of normality. A histogram of standardized residuals was generated (see Figure 12). The distribution of residuals appeared approximately normal, with a slight skewness towards positive residuals. The majority of the residuals were centred around zero, with no extreme deviations, supporting the assumption of normally distributed errors and homoscedasticity of variance. This suggests that the model's fit to the data is appropriate for interpretation.

Figure 12

Histogram of Residuals for Linear Mixed-Effects Model 1 (Baseline)



A correlation matrix (see Table 17) was generated to examine the relationships between the predictors (CYRM & AERM), SDQ, over TIME. The results indicate that TIME does not significantly correlate with any of the key variables in the current model. Given the

lack of significant correlations between TIME and the predictors or outcome variable, the inclusion of TIME as a fixed effect in the model is not justified, and subsequent models were simplified by removing this variable to improve parsimony.

Table 17

Pearson Correlation Matrix for TIME, CYRM, AERM, and SDQ

	TIME	CYRM Total	AERM	SDQ Total
TIME	1.000			
CYRM Total	.000	1.000		
AERM	.000	-0.08*	1.000	
SDQ Total	.000	-0.17**	-0.10**	1.000

*Indicates $p < .01$, **indicates $p < .001$.

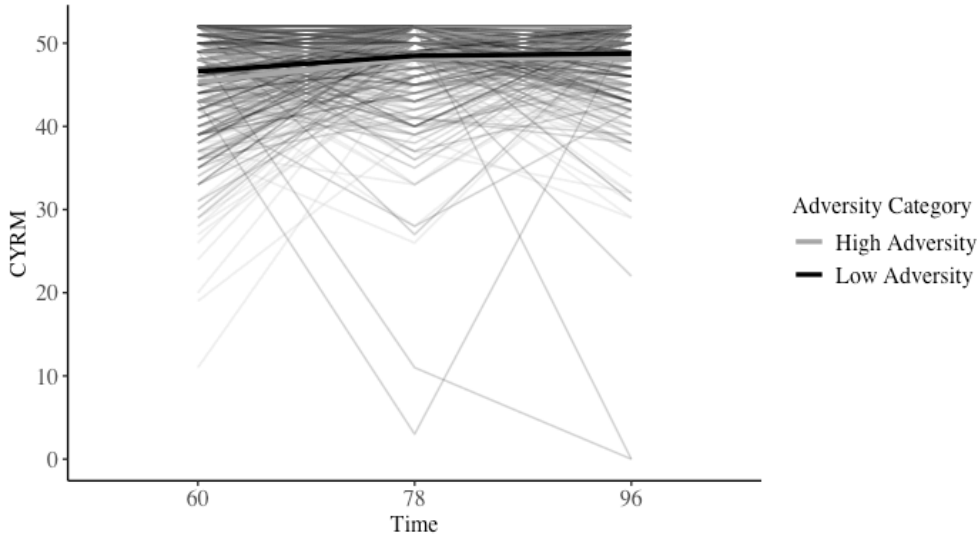
4.3.3 Multilevel Model 2: SDQ ~ AERM x CYRM

A second linear mixed-effects model ($N = 678$) was conducted to examine the effects of adversity (AERM; measured at 4.5 years) and CYRM on SDQ scores (see Figure 13 for schematic overview of adversity and resilience trajectories). The model also included the interaction between AERM and CYRM, with random intercepts for participants to account for within-person dependencies. Firstly, a significant yet negative interaction between AERM and CYRM was observed, $\beta = -0.19$, $SE = 0.03$, $t(1145.95) = -6.14$, $p < .001$. Subsequently, the results indicated a significant main fixed effect of AERM on SDQ, $\beta = 9.40$, $SE = 1.46$, $t(1145.97) = 6.44$, $p < .001$, such that higher levels of adversity were associated with increased SDQ scores. Similarly, a significant main fixed effect of CYRM on SDQ was found, $\beta = -0.16$, $SE = 0.03$, $t(1145.40) = -6.25$, $p < .001$, with higher CYRM scores associated with lower SDQ scores. The model's random effects showed variability within participants over time ($\sigma^2_{intercept} = 3.75$, SD = 1.94) and residual variance ($\sigma^2_{residual} = 18.17$, SD

= 4.27). This second model had an AIC value of 6808.1, which was lower than the baseline model (see Table 18), indicating improved model fit.

Figure 13

Individual Adversity and Resilience Trajectories Over Time



A histogram of the residuals (see Figure 14) for Model 2 was inspected to assess the assumption of normality. The residuals appeared approximately normally distributed, with a slight positive skew. Most residuals were concentrated around zero, with a few outliers on both ends of the distribution. This visual inspection supports the assumption that the residuals are reasonably normal and homoscedasticity of variance, suggesting that the model provides an adequate fit to the data.

Figure 14

Histogram of Residuals for Linear Mixed-Effects Model 2 (AERM)

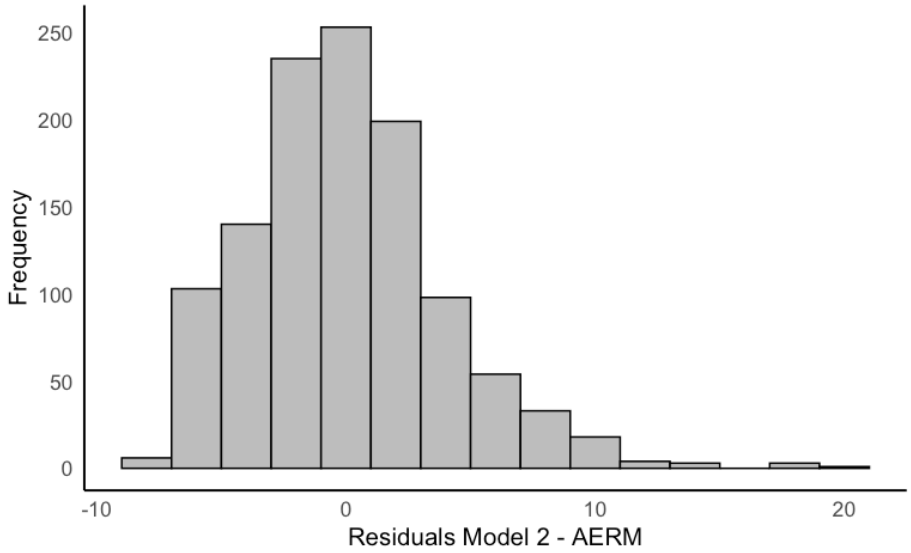
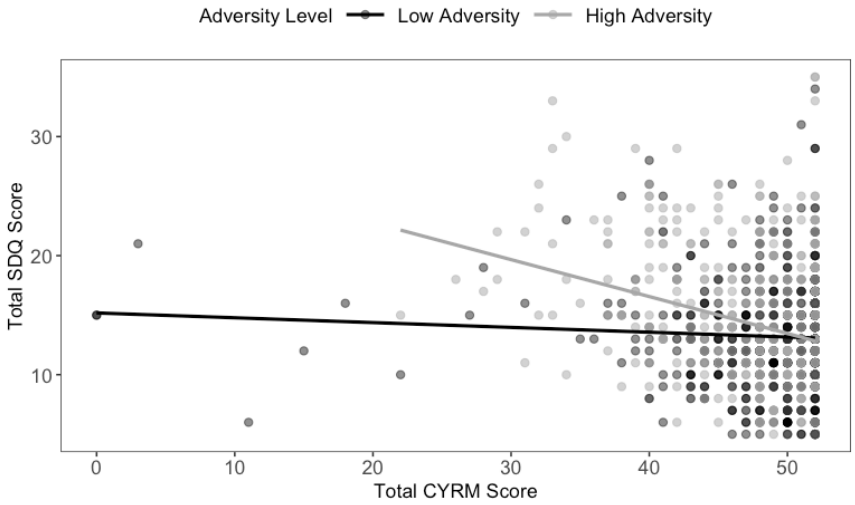


Figure 15 presents the interaction between AERM (categorized into low and high adversity) and CYRM in predicting SDQ scores. For children experiencing high adversity, the slope of the line indicates a stronger negative relationship between CYRM and SDQ scores, suggesting that higher CYRM is associated with lower SDQ scores. In contrast, for children experiencing low adversity, the slope of the line is flatter, indicating a weaker relationship between CYRM and SDQ scores. This aligns with the significant interaction effect observed in Model 2, highlighting that resilience serves as a more effective buffer against difficulties in contexts of high adversity.

Figure 15

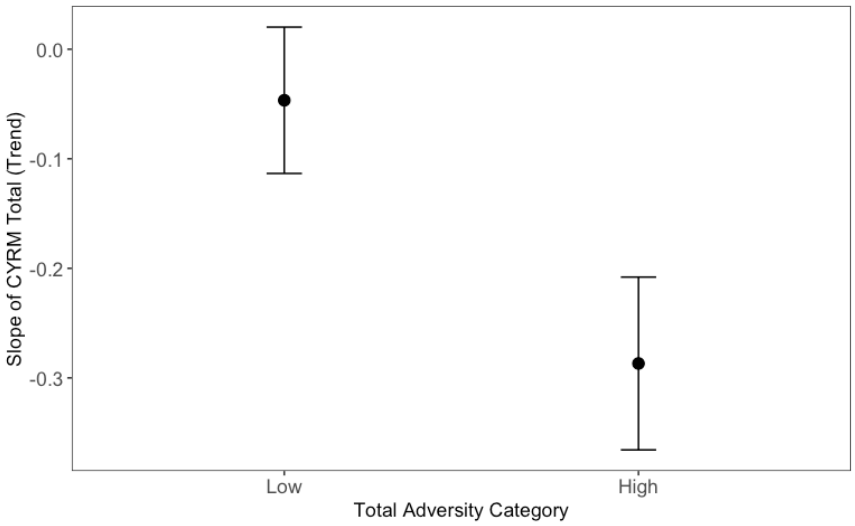
Plot With Interaction Effect of CYRM and AERM on SDQ



A simple-slope analysis was conducted to examine the effect of CYRM total on SDQ total at different levels of adversity. The slope of CYRM total was non-significant for low adversity (β = -0.047, *SE* = 0.070, 95%CI = [-0.113, 0.020]), but significant for high adversity (β = -0.287, *SE* = 0.077, 95%CI = [-0.366, 0.208]). A simple-effect contrast analysis confirmed this difference across the adversity categories (slope difference = 0.451, *SE* = 0.104, *t* = 4.32, *p* < .001), see Figure 16.

Figure 16

Plot With Trends of SDQ Against CYRM by Adversity Category



4.3.4 Multilevel Model 3a-c: SDQ ~ AERM x CYRM Subscales

Three separate models (N = 678) examined the effects of AERM and the three subscales of CYRM (Individual, Caregiver, and Contextual) on SDQ total scores, as well as their interaction effects. The AIC value for these models (Subscales; see Table 18) was slightly higher than the two previous models, suggesting that the model with CYRM total score has a better fit. Three significant interaction effects were found. Firstly, between AERM and CYRM Individual (β = −0.32, SE = 0.06, t(1141.21) = −5.77, p <0.001). The random effects indicated variance at both the within-child level ($\sigma^2_{intercept}$ = 3.86, SD = 1.96) and the residual level ($\sigma^2_{residual}$ = 18.14, SD = 4.26). Secondly, between AERM and CYRM Caregiver (β = −0.40, SE = 0.12, t(1145.99) = −3.28, p = .001). The random effects indicated variance at both the within-child level ($\sigma^2_{intercept}$ = 4.09, SD = 2.02) and the residual level ($\sigma^2_{residual}$ = 18.50, SD = 4.30). Thirdly, between AERM and CYRM Contextual (β = −0.47, SE = 0.09, t(1145.83) = −5.13, p <0.001). The random effects indicated variance at both the

within-child level ($\sigma^2_{intercept}$ = 4.25, *SD* = 2.06) and the residual level ($\sigma^2_{residual}$ = 18.18, *SD* = 4.26).

The residuals of Model 3a-c were evaluated for normality and distributional assumptions using a histogram (see Figure 17, Figure 18, & Figure 19). The histograms indicate that the residuals are approximately normally distributed, with a slight positive skew observed. Most residuals cluster around zero, suggesting that all three model's predictions align closely with the observed data and suggest homoscedasticity of variance. Extreme residuals are minimal, indicating that outliers do not heavily influence the model.

Figure 17

Histogram of Residuals for Linear Mixed-Effects Model 3a (CYRM Individual)

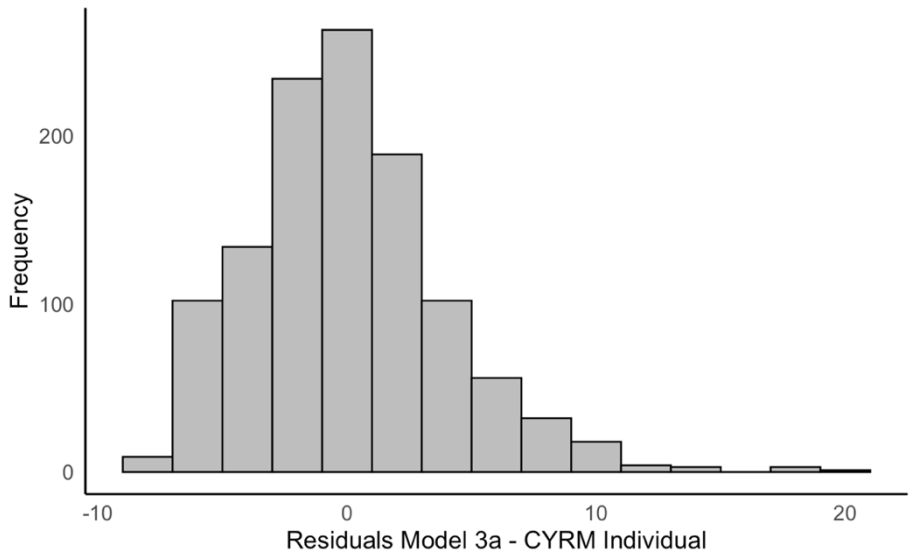


Figure 18

Histogram of Residuals for Linear Mixed-Effects Model 3b (CYRM Caregiver)

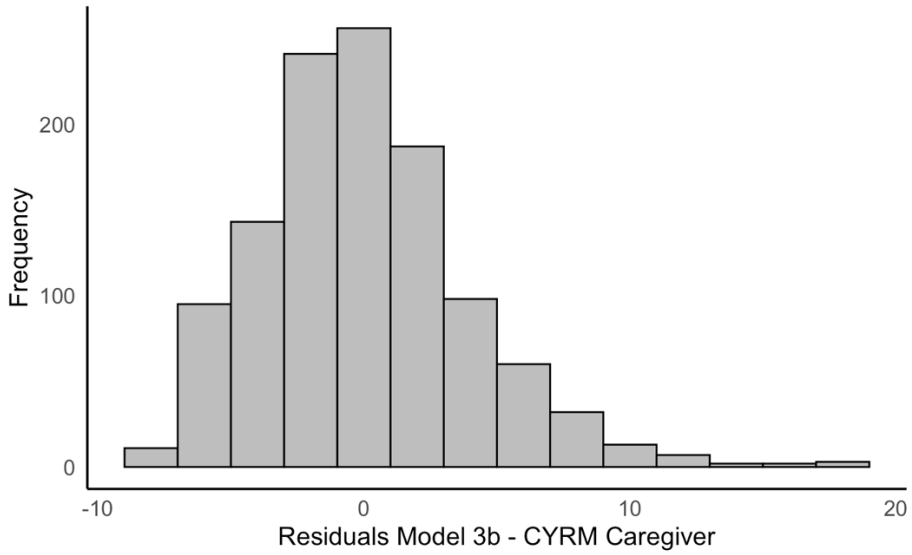
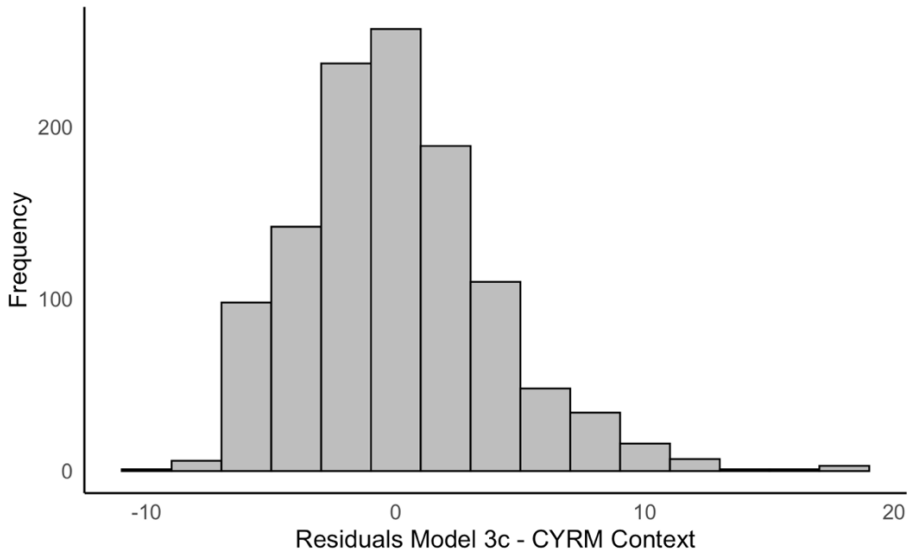


Figure 19

Histogram of Residuals for Linear Mixed-Effects Model 3c (CYRM Contextual)



The interaction between the CYRM subscales and AERM on SDQ is illustrated in Figure 20, Figure 21, & Figure 22. For children experiencing low adversity, there is a slight negative relationship between the CYRM subscales and SDQ total Score, indicating a modest protective effect of resilience on mental health. In contrast, for individuals experiencing high adversity, the negative slope is steeper, indicating that higher CYRM Subscale scores are more strongly associated with lower SDQ total scores.

Figure 20

Plot With Interaction Effect of CYRM Individual and AERM on SDQ

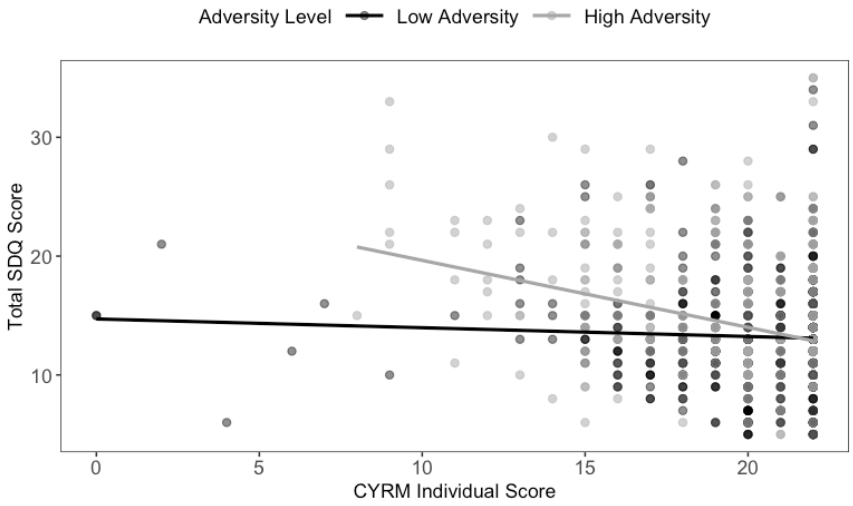


Figure 21

Plot With Interaction Effect of CYRM Caregiver and AERM on SDQ

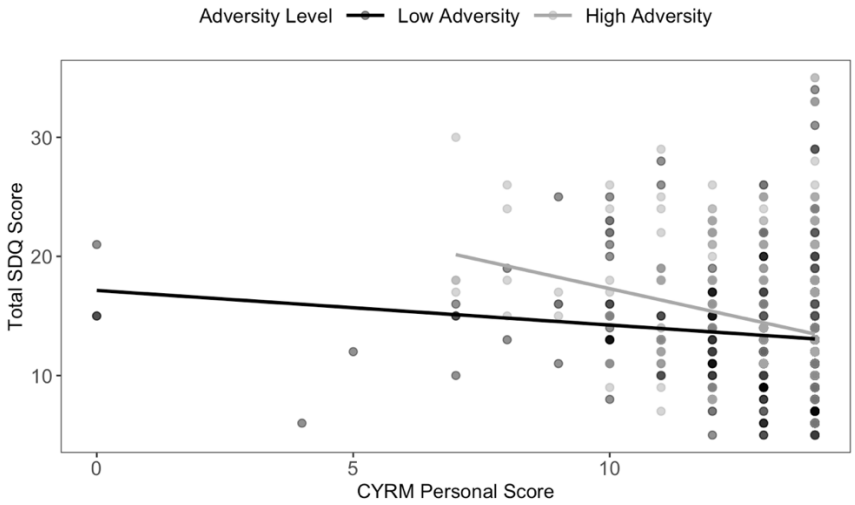
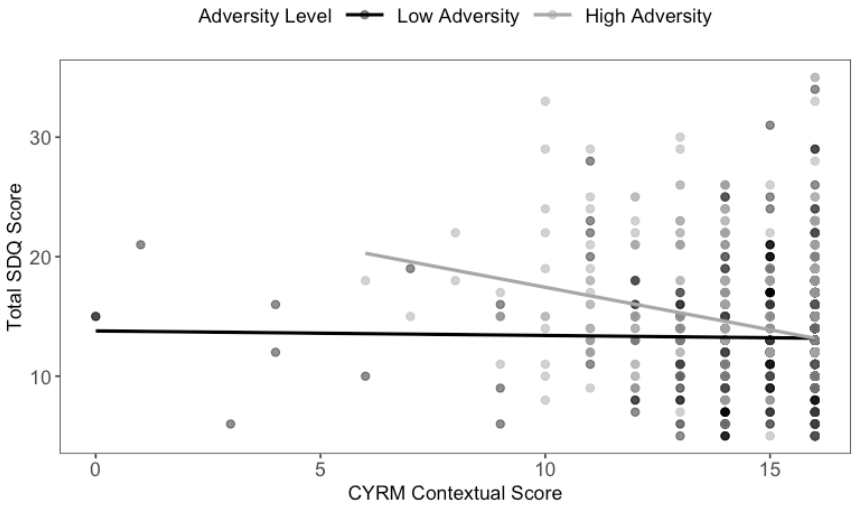


Figure 22

Plot With Interaction Effect of CYRM Contextual and AERM on SDQ



To investigate whether the relationship between the CYRM subscales and SDQ total varied across adversity categories**,** a simple slope analysis was conducted for each significant interaction. Firstly, for children experiencing low adversity, individual resilience was not

significantly associated with mental health outcomes (β = -0.095, *SE* = 0.070, 95%CI = [-0.232, 0.042]) since the confidence interval included zero. In contrast, for children in the high adversity group, individual resilience was strongly associated with mental health outcomes (β = -0.546, *SE* = 0.077, 95%CI = [-0.697, -0.394]). A pairwise comparison confirmed that the slopes significantly differed between the low and high adversity categories (Δβ = 0.451, *SE* = 0.104, $t(1142) = 4.32$, $p < .001$), see Figure 23.

Secondly, the slope of CYRM Caregiver under low adversity was significant (β = -0.276, *SE* = 0.123, 95%CI = [-0.518, -0.034]). Under high adversity, the slope of CYRM Caregiver was also significant (β = -0.875, *SE* = 0.167, 95%CI = [-1.202, -0.548]). A simple-effect contrast analysis confirmed this difference across the adversity categories (Δβ = 0.599, *SE* = 0.207, $t = 2.89$, $p < .01$), see Figure 24.

Lastly, context resilience was not significantly associated with mental health outcomes for children experiencing low adversity (β = -0.074, *SE* = 0.102, 95%CI = [-0.274, 0.125]), since the confidence interval included zero. For children experiencing high adversity, context resilience was associated significantly with mental health outcomes (β = -0.693, *SE* = 0.120, 95%CI = [-0.927, -0.458]). A simple-effect contrast analysis confirmed this difference across the adversity categories and context resilience (Δβ = 0.618, *SE* = 0.157, $t = 3.94$, $p < .001$), see Figure 25.

Figure 23

Plot With Trends of SDQ Against CYRM Individual by Adversity Category

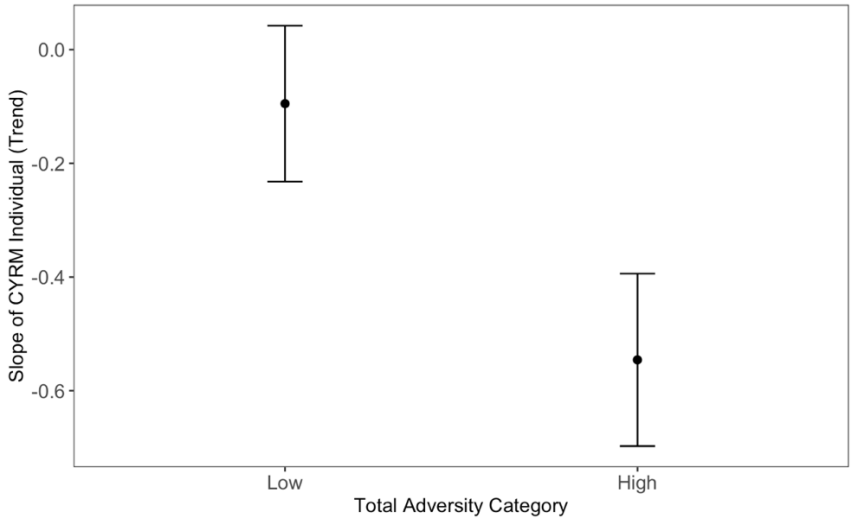


Figure 24

Plot With Trends of SDQ Against CYRM Caregiver by Adversity Category

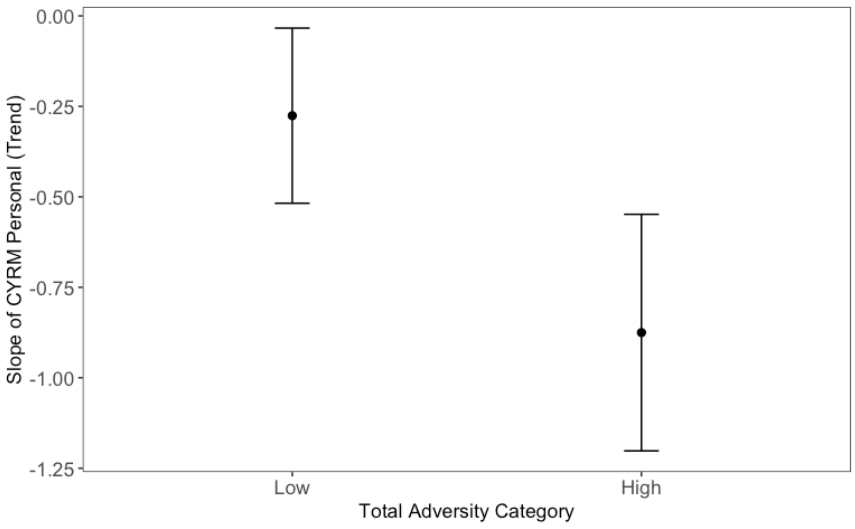
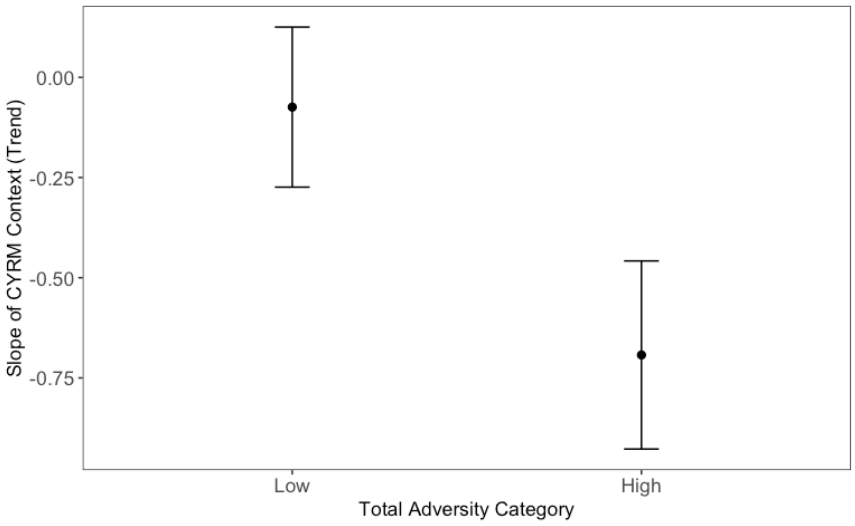


Figure 25

Plot With Trends of SDQ Against CYRM Contextual by Adversity Category



4.3.5 Multilevel Model 4-10: SDQ ~ CYRM x Moderators + AERM

Fifteen linear mixed-effects models were conducted to examine the effects of additional potential moderators on the relationship between CYRM and SDQ, while accounting for AERM. This resulted in six variables with a significant interaction effect with CYRM (see Table 18). Overall, the results indicate that temperament (ECBQ negative affect and surgency, but not effortful control), maternal resilience (CD-RISC at 4.5 years but not at 6 years), household income & caregiver employment status (only at 6 years) and emotion regulation (Rydell total at 5 years) are significant moderators in the relationship between CYRM and SDQ (see Table 19). Empathy, food security, maternal education level, and social cognition showed only non-significant interaction effects. The model with emotion regulation is showing the lowest AIC value (4852.3) compared to all the other models, indicating the most improved model fit.

Table 18

AIC and BIC Values for Each Significant Linear Mixed-Effect Model

Model	AIC	BIC
Model 1 (Baseline)	6852.25	6882.53
Model 2 (AERM)	6808.05	6838.33
Model 3a (CYRM Individual)	6811.58	6841.86
Model 3b (CYRM Caregiver)	6840.89	6871.18
Model 3c (CYRM Context)	6830.98	6861.27
Model 4a (ECBQ Negative Affect)	6414.76	6449.67
Model 4b (ECBQ Surgency)	6432.15	6467.07
Model 5 (Rydell)	4852.30	4885.16
Model 6 (Maternal Resilience)	6705.76	6740.96
Model 7 (Work Status)	6376.36	6411.23
Model 8 (Income)	6357.69	6392.55

Note. Lower values indicate better fit. Maximum Likelihood (ML) estimation was used to compute AIC and BIC values for model comparison, as REML is not appropriate for comparing model fit

Table 19

Summary of Linear Mixed Models Examining Moderators of SDQ Total.

Variable	β	*SE*	*df*	*t*	*P*	AIC	*N*	$\sigma^2_{intercept}$ (SD)	$\sigma^2_{residual}$ (SD)
ECBQ Negative Affect (4.5 years)	-0.01	0.002	1064.32	-5.01	<.001***	6414.8	639	4.27 (2.07)	17.77 (4.22)
ECBQ Surgency (4.5 years)	-0.005	0.002	715.41	-3.35	<.001***	6432.2	639	4.29 (2.07)	18.09 (4.25)
CD-RISC Maternal (4.5 years)	-0.044	0.016	1096	-2.74	<.01**	6705.8	665	4.37 (2.09)	18.04 (4.25)
Rydell Total (5 years)	-0.008	0.003	798.57	-2.648	<.01**	4852.3	488	4.15 (2.04)	19.63 (4.43)
Caregiver Employment Status (6 years)	-0.17	0.06	1067.90	-3.06	<.01**	6376.4	631	4.16 (2.04)	17.92 (4.23)
Household Income (6 years)	-0.18	0.04	976.12	-4.81	<.001***	6357.7	630	4.26 (2.07)	17.58 (4.19)

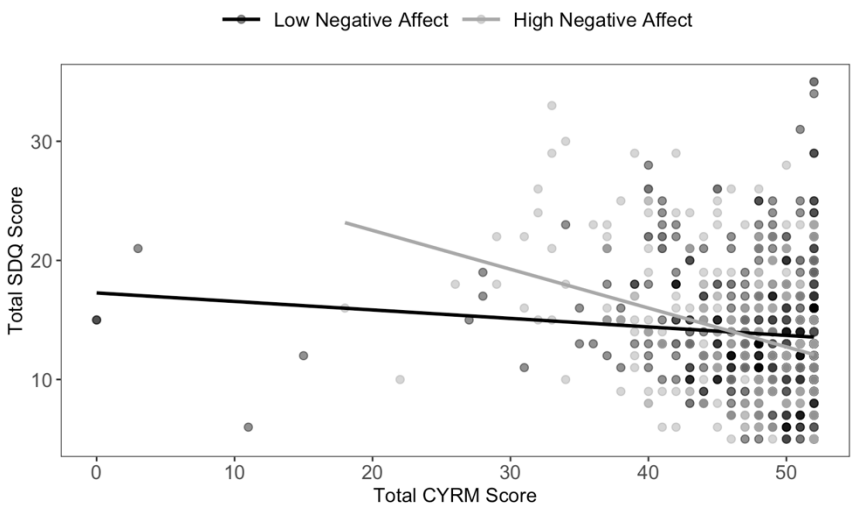
Note. Each variable represents a separate linear mixed model with SDQ Total score as the outcome variable, exploring the interaction effects with CYRM whilst accounting for AERM.

4.3.5.1 Temperament

An interaction effect was observed between temperament (negative affect) and CYRM on SDQ scores (Figure 26). At higher levels of negative affect, higher CYRM scores were associated with a decrease in SDQ scores, reflecting a protective effect. In contrast, at lower levels of negative affect, CYRM demonstrated a weaker protective effect on SDQ scores, as evidenced by an almost flat line.

Figure 26

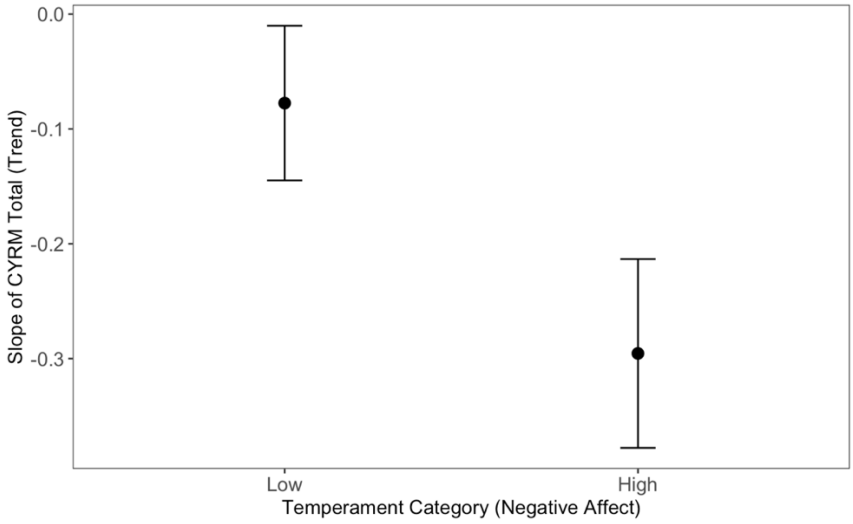
Plot With Interaction Effect of CYRM and AERM on SDQ, Moderated by Negative Affect



A simple slope analysis (see Figure 27) showed that the slope of CYRM total was significant for children with low negative affect (β = -0.078, *SE* = 0.034, 95%CI = [-0.145, -0.010]), and significant for children with high levels of negative affect (β = -0.296, *SE* = 0.042, 95%CI = [-0.378, -0.213]). A pairwise comparison confirmed that the slopes differed significantly (Δβ = 0.218, *SE* = 0.054, $t(1075) = 4.02$, $p < .001$).

Figure 27

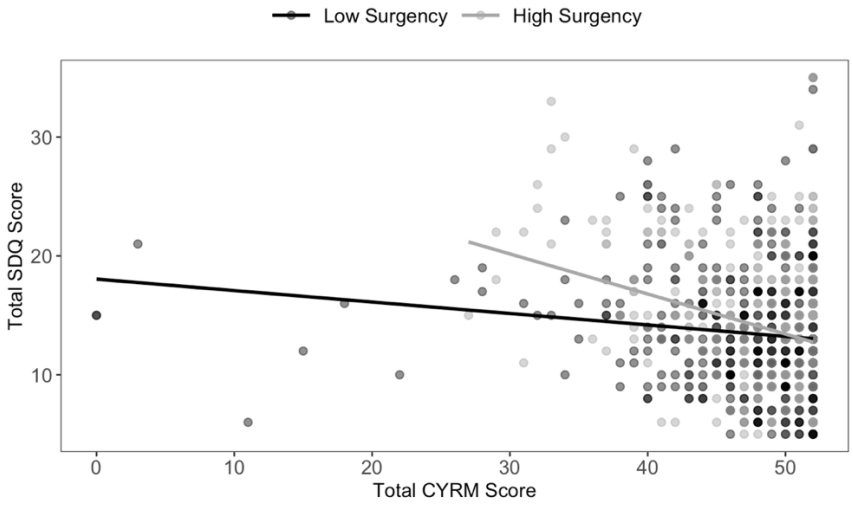
Plot With Trends of SDQ Against CYRM by Temperament (Negative Affect) Category



Another interaction effect was observed between temperament and CYRM on SDQ scores, this time with the surgency subscale (Figure 28). At higher levels of surgency, higher CYRM scores were associated with a significant decrease in SDQ total scores, reflecting a strong protective effect. Conversely, at lower levels of surgency, the protective effect of resilience on SDQ scores was less pronounced, as evidenced by a flatter slope.

Figure 28

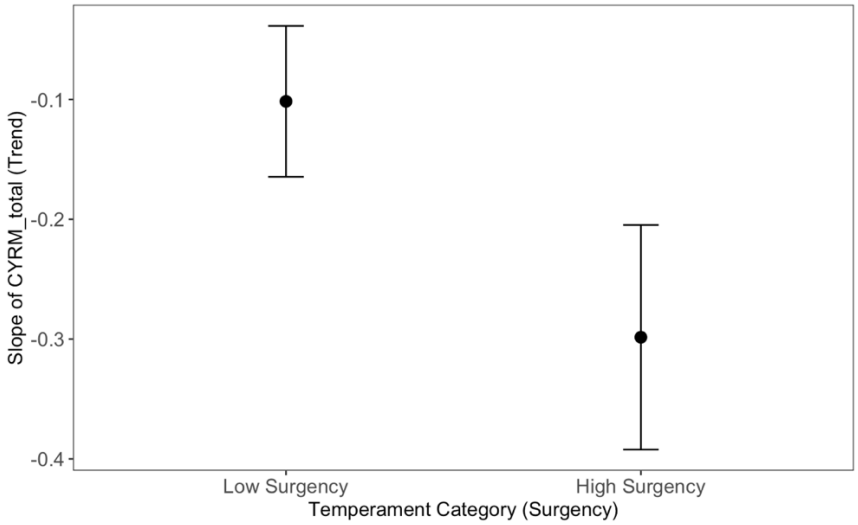
Plot With Interaction Effect of CYRM and AERM on SDQ, Moderated by Surgency



Simple-slope analysis (see Figure 29) revealed that for children with low levels of surgency, the slope of CYRM total was significant (β = -0.102, *SE* = 0.032, 95%CI = [-0.165, -0.039]). The slope of CYRM total was also significant for children with high levels of surgency (β = -0.298, *SE* = 0.048, 95%CI = [-0.392, -0.205]). The slope difference was significant (Δβ = 0.197, *SE* = 0.058, *t* = 3.43, *p* = .0006), as confirmed by a pairwise comparison.

Figure 29

Plot With Trends of SDQ Against CYRM by Temperament (Surgency) Category

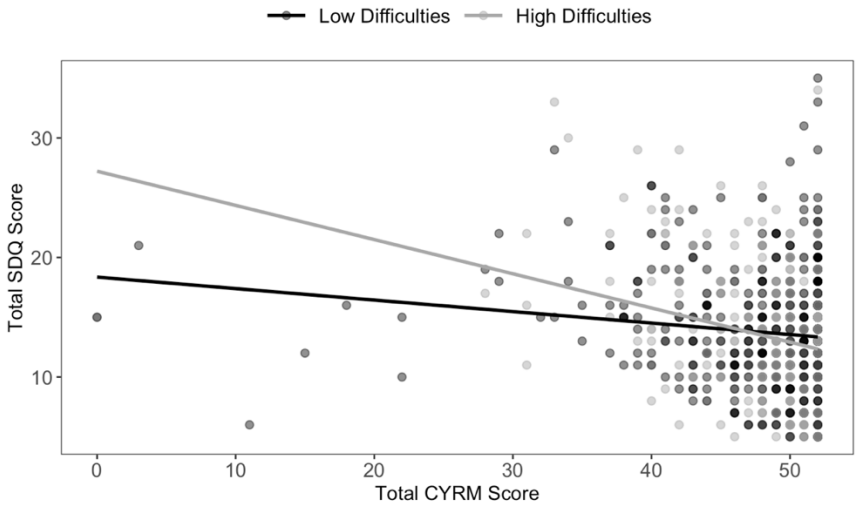


4.3.5.2 Emotion Regulation

A significant interaction was observed between emotion regulation at 5 years and CYRM on SDQ scores (see Figure 30). At higher levels of emotion regulation difficulties, the protective effect of CYRM was stronger, as evidenced by a steeper negative slope. For children with lower levels of difficulties in emotion regulation, the association between CYRM and SDQ scores was weaker.

Figure 30

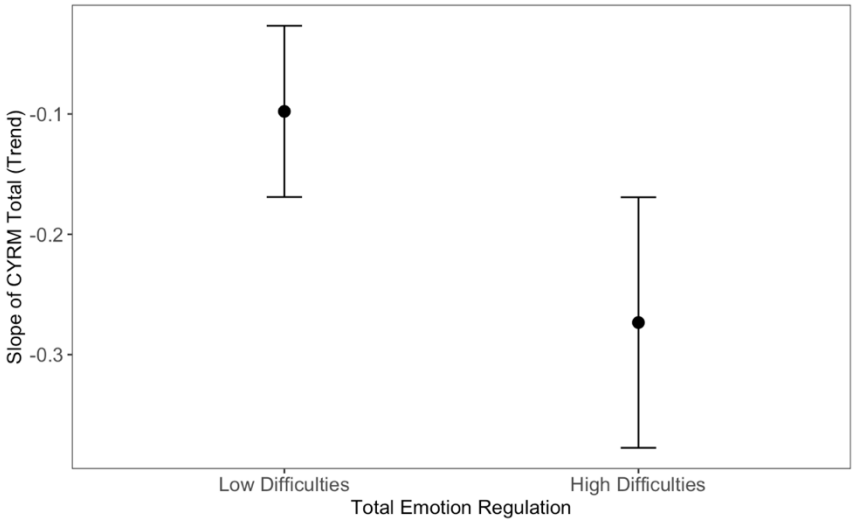
Plot With Interaction Effect of CYRM and AERM on SDQ, Moderated by Emotion Regulation



A simple-slope analysis (see Figure 31) was conducted, showing that for children with low difficulties the slope of CYRM total was significant (β = -0.098, *SE* = 0.036, 95%CI = [-0.169, -0.027]). The slope of CYRM total was stronger and significant for children with high difficulties (β = -0.273, *SE* = 0.053, 95%CI = [-0.377, -0.169]). The slope difference was significant for the emotion regulation categories (Δβ = 0.175, *SE* = 0.064, *t* = 2.73, *p* = .006).

Figure 31

Plot With Trends of SDQ Against CYRM by Emotion Regulation Category

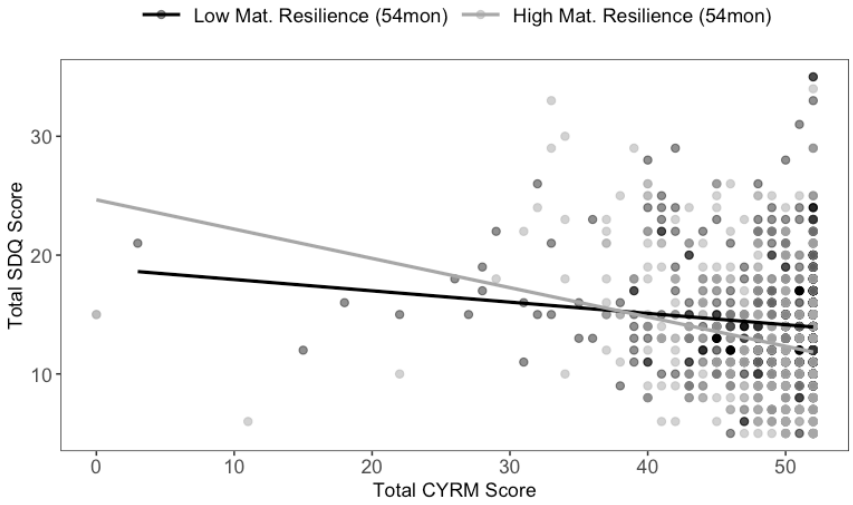


4.3.5.3 CD-RISC

The interaction effect between CD-RISC and CYRM on SDQ scores (Figure 32) indicated that for children whose mothers demonstrated higher CD-RISC scores, higher CYRM scores were associated with a steeper reduction in SDQ total scores. In contrast, for children with mothers who had low CD-RISC scores, the relationship between CYRM and SDQ scores was less noticeable.

Figure 32

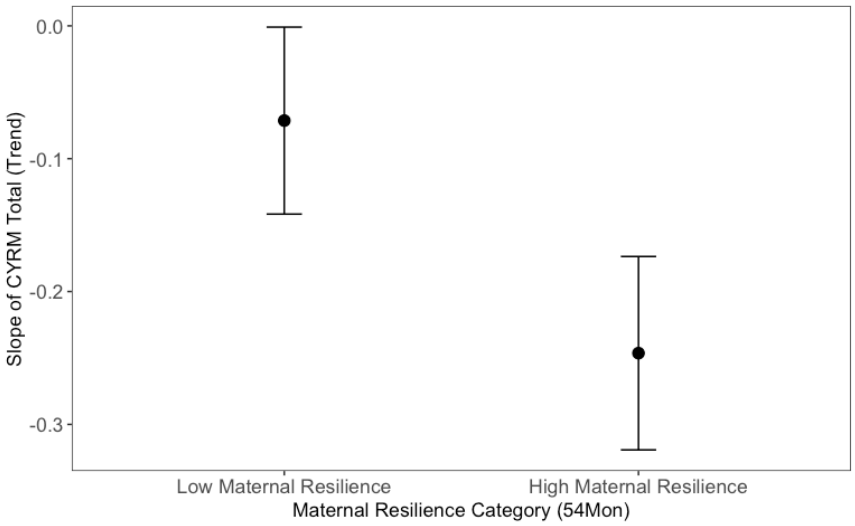
Plot With Interaction Effect of CYRM and AERM on SDQ, Moderated by Maternal Resilience



A simple slope analysis was conducted to examine the relationship between CYRM total and SDQ total across two levels of maternal resilience (low versus high maternal resilience). For low maternal resilience, the slope of CYRM total was significant (β = -0.071, *SE* = 0.036, 95%CI = [-0.142, -0.001]). Under high maternal resilience, the slope of CYRM total was also significant (β = -0.246, *SE* = 0.037, 95%CI = [-0.319, -0.174]). A simple-effect contrast analysis confirmed that the slopes differed significantly between the two maternal resilience categories (Δβ = -0.175, *SE* = 0.052, $t(1144) = -3.40$, $p = .0007$), see Figure 33.

Figure 33

Plot With Trends of SDQ Against CYRM by Maternal Resilience Category

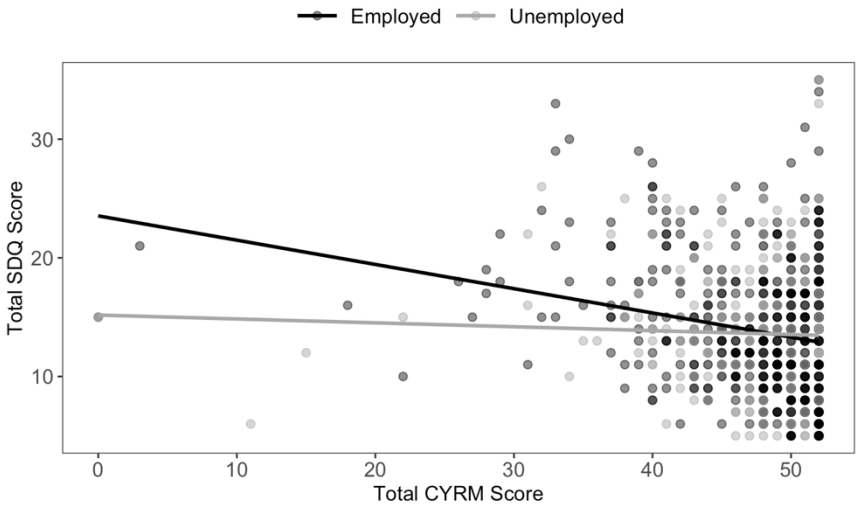


4.3.5.4 Caregiver Employment Status

Figure 34 depicts the interaction effect between caregiver employment status at 6 years and CYRM on SDQ scores. For the unemployed group, there is a steeper negative slope, suggesting that higher levels of CYRM are associated with a greater reduction in SDQ scores. The slope is flatter for the employed group, indicating that CYRM has a weaker relationship with SDQ in this group.

Figure 34

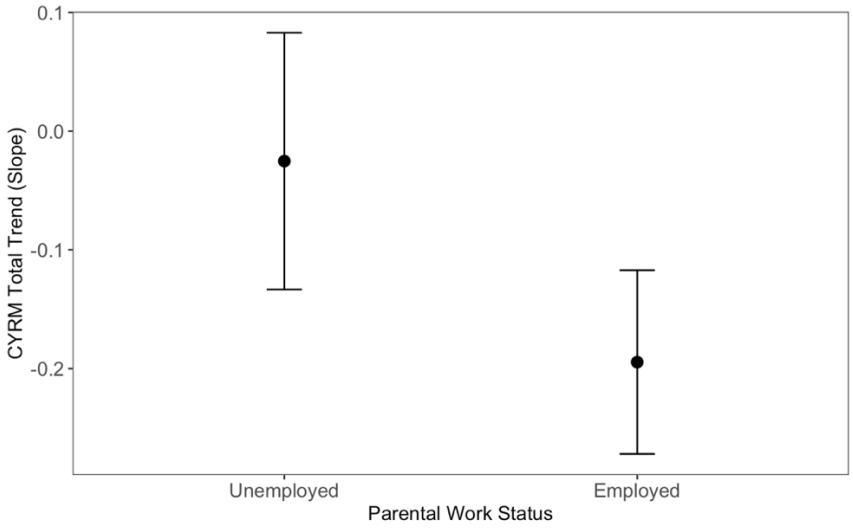
Plot of Interaction Effect of CYRM and AERM on SDQ, Moderated by Caregiver Employment



To investigate whether the relationship between CYRM total and SDQ total varied across employment status, a simple slope analysis was conducted. The slope of CYRM total was non-significant (β = -0.025, *SE* = 0.045, 95%CI = [-0.114, 0.063]), given that the confidence interval included zero, for children with unemployed mothers. The slope of CYRM total was significant for children whose mothers were employed, β = -0.195, *SE* = 0.032, 95%CI = [-0.258, -0.131]. A simple-effect contrast analysis confirmed that the slopes differed significantly between the two parental work status categories (Δβ = 0.169, *SE* = 0.056, *t* = 3.05, *p* = .002). These findings add to the interaction plot by showing the significant slope for employment status, see Figure 35.

Figure 35

Plot With Trends of SDQ Against CYRM by Caregiver Employment Category

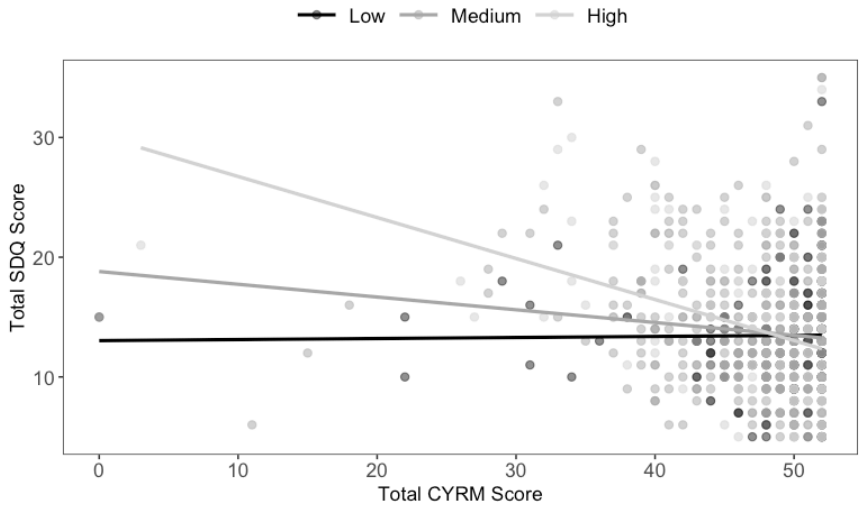


4.3.5.5 Household Income

The interaction effect between household income levels at 6 years and CYRM on SDQ scores was significant (Figure 36), indicating that the protective effect of CYRM varied by income level. Specifically, the relationship between CYRM and SDQ scores was stronger (steeper negative slope) for children from higher-income households compared to those from medium- or low-income households. For children from low-income households, CYRM scores appeared to hardly have a protective effect on SDQ scores.

Figure 36

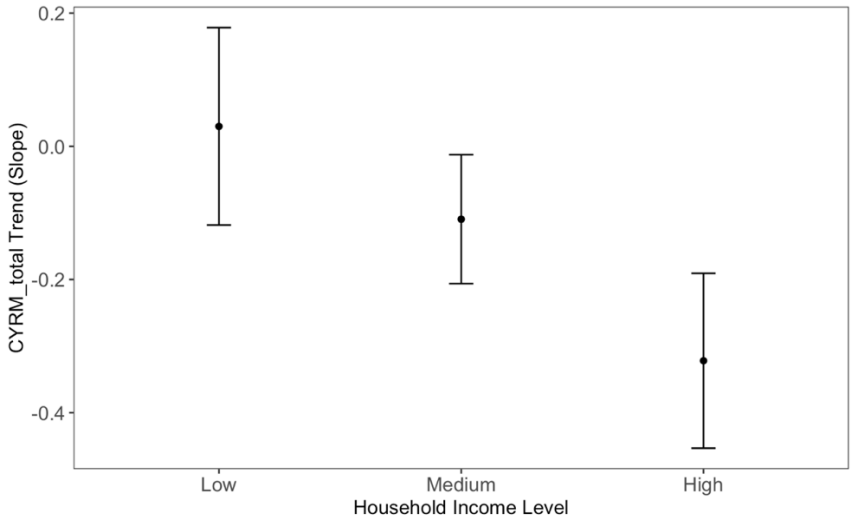
Plot With Interaction Effect of CYRM and AERM on SDQ, Moderated by Household Income



A simple-slope analysis (see Figure 37) was employed to investigate the relationship between CYRM total and SDQ total across three levels of household income. For low household income, the slope of CYRM total was positive but not significant (β = 0.030, *SE* = 0.056, 95%CI = [-0.080, 0.140]). For those with medium household income, the slope of CYRM total was negative and significant, though modest (β = -0.109, *SE* = 0.037, 95%CI = [-0.181, -0.038]). Lastly, for high household income, the slope of CYRM total was steeper and significant (β = -0.322, *SE* = 0.050, 95%CI = [-0.419, -0.225]). Pairwise contrasting using a simple-effect contrast analysis showed that the difference between low and high income levels was the largest (Δβ = 0.352, *SE* = 0.075, *t* = 4.70, *p* < .001), indicating a significantly stronger protective effect of resilience in high-income households compared to low-income households. The slope for medium income also differed significantly from high income (Δβ = 0.213, *SE* = 0.062, *t* = 3.45, *p* = .002). However, the contrast between low and medium income slopes was not significant (Δβ = 0.139, *SE* = 0.067, *t* = 2.08, *p* = .094).

Figure 37

Plot With Trends of SDQ Against CYRM by Household Income Level



4.4 Discussion

The present study aimed to identify protective factors that are associated with resilience over time in young children within a high-risk, low-income setting in South Africa. Specifically, I sought to uncover individual, social, and contextual pathways that are associated with enhanced childhood resilience, examine if early-life adversity correlates with resilience and mental health outcomes over time, and determine the moderating effect of child temperament, empathy, social cognition, and contextual factors like maternal resilience, employment, education, household income, and food security on resilience and mental health.

4.4.1 Research Question 1: Resilience Over Time

The findings indicate that resilience increased significantly from 5 years (M = 45.13, SD = 6.42) to 6.5 and 8 years (M = 48.53, SD = 5.05; M = 48.57, SD = 5.45) suggesting that resilience is not static but develops over time in young children. This is in line with existing literature, labelling resilience as a dynamic concept showing variation across different times

and developmental stages (Masten, 2014; Rutter, 2012; van Rensburg et al., 2019). However, resilience total scores across all timepoints clustered near the upper end of the scoring range (maximum = 52). This distribution, combined with the negative skewness values at all timepoints (-2 at 5 years, -3.37 at 6.5 years, and -3.73 at 8 years), suggests that a significant proportion of participants achieved scores near the maximum. This clustering indicates a potential ceiling effect, which may limit the measure's ability to differentiate among children with higher levels of resilience. Ceiling effects are determined when 15% of a sample returns the highest score (Windle et al., 2011), indicating a ceiling effect for resilience at 6.5 years (25.1% max scores) and at 8 years (35.2% max scores). This ceiling effect could suggest that the CYRM may not fully capture the true variability in resilience among children in our sample, particularly at the higher end of the resilience spectrum. Alternatively, the observed ceiling effect may reflect a genuine developmental trend in which most children in our sample approach the maximum measurable level of resilience as they grow older.

Further analyses revealed weak to modest correlations between the total resilience scores at the three timepoints. suggesting considerable inter-individual differences in trajectories of resilience over time. This pattern underscores the dynamic nature of resilience, which may be influenced by developmental changes or contextual factors. The low correlations also highlight the value of examining within-person effects and the relationship between resilience and other variables over time.

The resilience subscales—Individual, Caregiver, and Contextual— showed similar patterns of increase, highlighting the multifaceted nature of resilience development. However, like the total scores, the subscales also displayed clustering of scores near the upper limits. When using the median threshold score to categorise low versus high resilience, 69.4% of participants exhibited changing patterns over time, while only 8.8% ($N = 43$) consistently remained in the low resilience group, and 19.9% ($N = 99$) were consistently in

the high resilience group across all timepoints, adding evidence to the dynamic nature of resilience. An ANOVA further revealed no significant mean differences in resilience scores between 6.5 and 8 years. This lack of difference further supports the notion of a ceiling effect, particularly as children approach the upper limits of the measure's scoring range.

4.4.2 Research Question 2: The Association of Resilience and Adversity with Mental Health

In this South African birth cohort, I found that higher resilience scores were associated with lower mental health difficulties, confirming my hypothesis. This finding is consistent with existing global literature that identifies resilience as a protective factor, buffering children against adverse outcomes (Masten, 2014; Rutter, 2012; van Rensburg et al., 2019). Notably, there were no growth trajectories that could be discerned to investigate the inter-individual differences in the relationship between resilience and mental health difficulties over time. This lack of a temporal effect may be (partially) explained by the observed ceiling effects in resilience scores at 6.5 and 8 years, which could have limited the measure's sensitivity to changes in resilience over time.

As hypothesised, Model 2 demonstrated a significant interaction between adversity and resilience on mental health outcomes. This protective effect of resilience was particularly pronounced in children experiencing higher levels of adversity, suggesting that resilience plays a critical role in mitigating the detrimental effects of adversity and promoting better mental health outcomes over time. This finding is significant as it highlights the interplay between adversity, resilience, and mental health within a single model. A large body of research has emphasized the gap in directly measuring adversities when discussing resilience (Masten, 2011; Yates et al., 2015), making this contribution noteworthy. The use of the

AERM score, which integrates both adverse childhood experiences and the associated emotional responses, provides a more comprehensive understanding of how adversity, emotional reactions, resilience, and mental health outcomes interact. Moreover, the finding that high levels of adversity paired with high levels of resilience are associated with lower mental health difficulties suggests that young children in this cohort are already able to leverage internal and external resources to support their strengths. My longitudinal research aligns with research that has identified pathways of resilience following adversity, showcasing positive adaptation even in challenging contexts (Masten & Cicchetti, 2016). These results further underscore the importance of fostering resilience as a means of supporting mental health, particularly in high-risk settings.

Model 3a-c revealed significant interaction effects between adversity and each of the three subscales of resilience on mental health outcomes. Specifically, higher scores on the Individual and Contextual resilience subscales were associated with lower mental health difficulties, particularly for children experiencing higher levels of adversity. These findings suggest that individual traits, such as personal skills, peer support, and social skills, along with contextual supports, including spiritual, community, and cultural resources, are crucial protective factors that enhance resilience and buffer against mental health difficulties in high-risk environments. Noteworthy is that in high-risk contexts children with fewer mental health difficulties appear to also draw on individual and contextual resources, potentially due to a need for greater self-reliance. These findings align with adolescent resilience research in sub-Saharan Africa (Theron, 2023) and South Africa (Theron & Theron, 2010; van Breda & Theron, 2018), which highlights the protective role of community resources and the cooperative effect of individual strengths and external affective supports.

Furthermore, the Caregiver subscale, which reflects the child's relationship with their primary caregiver, showed a significant interaction effect on mental health outcomes, for both low and high levels of adversity. Regardless of the level of adversity, children that have high levels of Caregiver resilience have lower mental health difficulties. The caregiver-child relationship appears pivotal in fostering resilience in young children, underscoring its protective role across all levels of adversity. This aligns with earlier research recognizing caregiver support as a critical factor in fostering resilience, particularly during early and middle childhood (Masten, 2014; Yates & Mantler, 2023). This interplay underscores the importance of fostering individual, caregiver, and contextual resilience factors in interventions aimed at improving child mental health in high-adversity contexts.

4.4.3 Research Question 3: The Influence of Child Factors and Adversity on Mental Health

The moderator analyses identified several factors that moderated the relationship between resilience and mental health outcomes, whilst accounting for adversity. Notably, contrary to my hypothesis, children with greater emotion regulation difficulties showed a stronger association between resilience and positive mental health outcomes. This pattern suggests that in times of heightened regulation challenges, resilience may provide a stronger buffering effect on mental health. Emotion regulation remains a crucial resource during adversity, as it supports adaptive coping and reduces the negative impact of stress (Bonanno, 2004; Polizzi & Lynn, 2021). However, when emotion regulation is compromised, resilience appears to play an even more critical role in fostering positive outcomes.

Additionally, contrary to my hypothesis, the temperament traits of negative affect and surgency were significant moderators of the resilience-mental health relationship.

Specifically, children with higher levels of emotional reactivity (negative affect) and impulsivity or risk-taking (surgency) experienced a stronger protective effect of resilience on mental health, even when accounting for adversity. This indicates that resilience is particularly beneficial under high-risk conditions where elevated negative affect and surgency would otherwise exacerbate mental health difficulties. In these cases, resilience seems to act as a buffer, mitigating the negativity of these temperament traits. These findings highlight a direct link between temperament and resilience, as well as its subsequent association with mental health outcomes. Although previous research has suggested indirect links between temperament, prosocial behaviour, and resilience (Rydell et al., 2003; Zolkoski & Bullock, 2012), my results provide the first evidence for a direct relationship between temperament, resilience, and better mental health outcomes. This is consistent with prior work in low-risk environments (Rothbart, 2007) and underscores the role of individual characteristics in shaping resilience.

Importantly, this study addresses a gap in the literature (Theron, 2023) by explicitly linking individual capacities such as emotion regulation and temperament with resilience and mental health outcomes in young children, particularly in the South African context. These findings emphasize the importance of fostering emotion regulation and adaptive temperament traits in early childhood to enhance resilience and support mental health in high-adversity settings.

Contrary to our expectations, empathy and social cognition at 4.5 years did not correlate with resilience over time. These findings may be due to developmental factors, measurement limitations, or the specific high-risk context of our birth cohort. It is possible that in environments with high adversity, the development and influence of empathy and social cognition on resilience are overshadowed by more immediate survival and coping

mechanisms (Kara & Selcuk, 2023; Panagou & Macbeth, 2024).

4.4.4 Research Question 4: The Influence of Maternal and Family Factors and Adversity on Mental Health

4.4.4.1 Maternal Resilience

Partially confirming my hypothesis, maternal resilience at 4.5, but not at 6 years, emerged as a significant moderator of child resilience over time, while accounting for adversity. At 4.5 years, the interaction plot and subsequent slope analysis revealed that for children whose mothers exhibited higher resilience, higher child resilience was associated with a greater reduction in SDQ scores. These results highlight the importance of maternal resilience as a contextual factor that amplifies the protective role of child resilience in reducing mental health difficulties at a young age. Specifically, maternal resilience appears to strengthen the association between child resilience and positive mental health outcomes. The relationship between maternal and child resilience has received limited attention in the literature (Gavidia-Payne et al., 2015), and was even being referred to as an "unknown relationship" with conflicting findings in systematic reviews (Yates & Mantler, 2023, p. 830). This study offers a unique contribution by demonstrating that the protective effect of resilience may be amplified in contexts of higher maternal resilience. The absence of a significant interaction effect at 6 years may align with a broader developmental perspective, wherein children are still in the very early stages of developing their own social abilities and gradually move beyond the scope of parental influence and become increasingly oriented toward peers (Braet et al., 2014).

These findings, along with the pivotal role of Caregiver resilience across adversity levels, highlight the important role of the caregiver in young children's lives. When maternal

resilience is low, the protective association between resilience and mental health appears weakened, highlighting the important interplay between maternal and child resilience. Importantly, this finding underscores the need to consider the broader familial context when interpreting resilience as a protective factor. It also suggests that interventions targeting child mental health should account for maternal resilience, potentially focusing on strengthening both individual and relational aspects of resilience within families to maximize protective effects.

4.4.4.2 Caregiver Employment Status and Household Income

As hypothesised, caregiver employment status at 6 years significantly moderated the relationship between resilience and mental health outcomes. For children whose caregivers were employed, higher levels of resilience were associated with a greater reduction in mental health difficulties. This finding suggests that child resilience may play a more critical role in promoting positive adaptation in contexts where economic resources and supportive opportunities are present (Masten & Narayan, 2012).

Household income at 6 years also emerged as a significant moderator, with the protective effect of resilience being stronger for children from higher-income households. Greater financial stability may provide access to resources such as tutoring or enriching activities, or alleviate maternal stress levels, which enhance the child's ability to adapt and thrive. Interestingly, this contrasts with earlier research in a South African context, which linked lower maternal income to higher levels of resilience (Rotheram-Borus et al., 2019). This discrepancy may point to different resilience pathways across different lower-income settings.

Notably, both factors emerged as significant moderators at 6 years but not at earlier timepoints, suggesting that socioeconomic influences may become more pronounced as

child-rearing costs increase and financial resources seem to play a greater role in shaping resilience pathway. These findings underscore the complex interplay between socioeconomic factors and resilience, suggesting that while resilience is a critical protective factor across all socioeconomic levels, its effects seem to be shaped by access to financial stability, caregiver employment, and maternal resilience. Future research should examine the mechanisms underlying these associations and explore how socioeconomic variables influence resilience pathways in high-adversity settings. Such insights can inform tailored interventions that strengthen both individual resilience and contextual supports, including policies that promote caregiver employment and reduce economic inequalities.

4.4.4.3 Maternal Education and Food Security

Maternal education level and food security did not show significant interaction effects with resilience and mental health. This suggests that, within the DCHS cohort, these factors were not a distinguishing factor in the development of resilience or in buffering against mental health difficulties. Maternal education, while important, might not have had an immediate impact unless it translated into financial stability since caregiver employment status and household income were important factors to consider. Families with higher income and stable employment might have been able to mitigate the effects of food insecurity more effectively by providing stability and support.

4.4.5 Strengths and Limitations

This study has several methodological strengths, including the use of a prospective birth cohort from a high-risk community sample in an LMIC. The study's longitudinal approach allows for the examination of changes and trajectories in resilience and mental health outcomes over time, while explicitly factoring in adversity. This design allowed for

identifying developmental patterns and assessing the dynamic nature of resilience. With 678 participants, the study had sufficient statistical power to detect meaningful effects and explore interactions. The sample's South African context, particularly the high-risk, low-income setting, provided valuable insights into resilience mechanisms in underrepresented populations. Using the CYRM (a tool designed and developed in South Africa) and its subscales (Individual, Caregiver, and Contextual), the study captured the multifaceted nature of the protective factors that boost resilience, rather than concentrating on the dichotomous answer to whether resilience is absent or present. This nuanced approach allowed for a deeper understanding of how different dimensions of resilience interacted with adversity and mental health, without focusing too much on the behavioural outcomes. By investigating maternal resilience, caregiver employment, and household income as moderators, the study contextualized resilience within the broader socio-economic and familial environment, providing actionable insights for interventions. The study highlighted underexplored areas, such as the role of maternal resilience, child emotion regulation, and temperament, and the potential buffering effects of individual, caregiver, and contextual factors in high-adversity settings. These findings address gaps in the resilience literature and contribute novel insights.

There are nonetheless several limitations to consider. The CYRM scores at 6.5 and 8 years showed clustering near the maximum, indicating possible ceiling effects. This limits the measure’s ability to detect further improvements in resilience and may obscure nuanced differences among highly resilient children. The weak correlations between CYRM scores across timepoints suggested variability that may reflect either true developmental shifts or measurement inconsistencies. While the South African context of high-risk, low resource communities provided valuable insights, the findings may not automatically generalize to other cultural or socio-economic contexts across LMICs. However, given shared structural and economic challenges across many LMICs, these findings remain highly relevant and may

offer useful insights for similar settings. Additionally, the focus on a specific high-risk cohort may not capture resilience mechanisms in less adverse environments in LMICs. The study's use of caregiver tools may have introduced bias, such as social desirability or recall bias, particularly when caregivers were required to self-report their own caregiving practices. The extremely high scores observed on the CYRM may further reflect these biases. Caregivers may have over-reported resilience due to perceived societal expectations, a desire to present themselves or their children in a favourable light, or a lack of critical reflection on the child's actual resilience. Observational or multi-informant approaches could have provided a more holistic assessment. While the study identified significant interactions (e.g., between adversity and resilience), it did not fully explore the mechanisms underlying these effects. Future research could investigate potential mediating factors such as emotion regulation strategies (e.g., cognitive reappraisal, suppression) or social support sources (e.g., family versus peer networks) to better understand how resilience operates in different contexts. Longitudinal studies incorporating physiological measures (e.g., cortisol levels as an indicator of stress regulation) or qualitative approaches could provide deeper insight into these pathways and their developmental trajectories. Finally, although the study controlled for key factors, other unmeasured variables (e.g., neighbourhood safety, parenting practices, the impact of COVID-19) could influence the observed relationships between resilience, adversity, and mental health.

4.5 Conclusion

This study contributed valuable insights into the interplay between protective factors that are associated with resilience, adversity, and mental health outcomes in young children within a high-risk, low-income South African context. By adopting a longitudinal design, it highlighted the dynamic and multifaceted nature of resilience, demonstrating how individual,

caregiver, and contextual factors interacted over time to buffer against the negative impacts of adversity on mental health. The findings underscored the protective role of resilience, with higher resilience scores consistently associated with lower mental health difficulties. Importantly, this study addressed a critical gap in the literature by explicitly incorporating childhood adversity, including both violence exposure and emotional distress responses, into the model. By including adversity and mental health measures, the study offered a more explicit, comprehensive, and holistic understanding of how resilience operates within high-adversity contexts.

Notably, the study revealed that resilience plays a particularly critical role in mitigating the effects of adversity, especially in contexts characterized by maternal resilience, employment status, or economic resources. These results emphasize the importance of fostering resilience both at the individual level, through emotion regulation and adaptive temperament traits, and within broader socio-economic and familial contexts. By highlighting the interplay between individual, caregiver, and contextual factors, this study makes a significant contribution to the literature, providing a deeper understanding of the factors that are associated with childhood resilience in high-adversity settings.

Overall, this study advances our understanding of resilience in early childhood, particularly in underrepresented populations facing high adversity. Its findings highlight the importance of interventions that target not only individual resilience factors but also the familial and socio-economic contexts that support resilience. Future research should address the identified methodological limitations and explore mechanisms underlying the observed interactions to inform more effective, contextually relevant interventions that promote resilience and mental health in high-adversity settings.

Chapter 5 – General Discussion

This final chapter provides a comprehensive overview of the thesis's key findings, presented in a summarized and integrated form. These findings are then discussed in relation to prior research, highlighting their significance and contributions to the field. The chapter also addresses general limitations of the study and outlines directions for future research, particularly emphasizing the need for expanded resilience research in LMICs. Finally, clear, and well-articulated conclusions are presented, synthesizing the study's broader implications for resilience theory, research, and practice.

5.1 Key Findings per Chapter

As highlighted in Chapter 1, this thesis aimed to foreground the protective factors that are associated with resilience over time in young children from a high-risk, low-income South African birth cohort study. Furthermore, this thesis sought to deepen understanding of the interplay between resilience, adversity, and mental health outcomes. The key findings of this thesis were as follows:

5.1.1 Objective 1

Objective 1: To identify and consolidate existing evidence on protective factors that enhance resilience in children aged 10 years and younger in LMICs, while highlighting gaps in knowledge (Chapter 2, p. 15-45).

This chapter presented a scoping review of resilience research in children under 11 years old from LMICs, synthesizing evidence on protective factors and identifying critical gaps. The review encompassed 4325 articles screened for inclusion, of which 26 (from 14 countries) met inclusion criteria. Three studies used a mixed-method approach and no purely qualitative studies were found eligible for inclusion. The quality of the included quantitative

studies ranged from poor (2 studies) to excellent (1 study), with the majority being of fair/good quality (19 studies). Only half of the studies employed direct and quantitative measures of resilience, despite all claiming to assess resilience as a moderator, mediator, intervention, or outcome. One study (Jordan & Graham, 2012) even lacked an operational definition despite resilience being central to its focus. Common adversities studied included malnutrition, exposure to violence, poverty, and parental challenges such as mental health issues, HIV, or absence. However, most studies failed to include a direct measurement of adversities, which is essential when trying to measure whether stress has made a significant impact.

Key contributors to resilience included social support (from schools, teachers, or role models), feelings of connectedness, positive parenting practices, and community support. Emotion regulation was also highlighted as a critical factor in some studies. However, commonly reported protective factors in resilience research in the Global North like peer relationships and religion have not been investigated in LMICs. Only four of the included studies employed a longitudinal design, and only two measured resilience at multiple points. This limited evidence suggested resilience varied across developmental stages, with unique factors influencing outcomes at different ages. However, research with more than two timepoints is needed to track developmental pathways of resilience. In summary, the review identified a significant paucity of data on resilience in children aged 10 years and younger in LMICs, especially in longitudinal contexts. It emphasized the importance of exploring developmental trajectories, the protective effect of social support, and under-researched factors such as peer relationships and religion. With an age-group (children <11 years) that is underrepresented in the resilience research in a disadvantaged context (Theron et al., 2013; Ungar, 2004) developmental trajectories associated with pathways leading to resilience need to be uncovered.

5.1.2 Objective 2

Objective Two: To present a comprehensive perspective on childhood adversity by examining children's exposure to community violence along with their emotional response to it (Chapter 3, p. 46-78).

This chapter developed and tested a novel bifactor model for measuring adversity in a high-risk South African cohort, combining two existing tools to account for both exposure to violence and emotional distress responses. The bifactor model successfully identified a general adversity factor and four distinct subscales. The general factor (Adversity Exposure-Response Model; AERM) emerged as the strongest predictor of direct child trauma exposure, indicating internal validity. This is significant since the total scores of the two original measures (CECV and PEDS) were unable to predict trauma exposure. The AERM reflects the cumulative burden of adversity, and not only the violence exposure, transcending the assumption that all adverse events have the same negative emotional response. The inclusion of a child's emotional response is a move beyond the summative approach of the ACEs framework.

The results further showed that approximately 75% of children were reported to have had exposure to community violence, yet only 8% reportedly showed elevated distress, and 6.5% exhibited high scores on both violence exposure and distress. There was also a heterogeneity in trauma responses, with a full range of emotion distress scores at the lowest levels of violence exposure, supporting the construction of the AERM to account for interindividual difference in emotional response. Compared to norm data from the USA, fewer children in this cohort exhibited signs of emotional disturbance despite high violence exposure (7.7% in South Africa, vs 10% in the USA). This discrepancy may reflect social desirability bias in caregiver reporting or cultural normalization of trauma. This study

showcased the value of combining measures to provide a comprehensive view of adversity, moving beyond frequency and severity of experienced adverse events to capture nuanced emotional responses. Given the potential long-term consequences of emotional distress, the AERM was able to provide valuable insight how children process emotional distress and responds to violence, providing a valuable contribution to the literature.

5.1.3 Objective 3

Objective Three: To investigate the relationship between resilience, adversity, and mental health outcomes over time in children aged 8 years and younger in a South African birth cohort study (Chapter 4, p. 79-148).

This chapter utilised a longitudinal design to explore the relationship between resilience, adversity, and mental health outcomes in children aged 5-8 years. The findings underscored the dynamic nature of resilience, as resilience increased significantly from 60 months (M = 45.13, SD = 6.42) to 78 and 96 months (M = 48.53, SD = 5.05; M = 48.57, SD = 5.45). Despite these increases, the correlations between total resilience scores across the three timepoints were weak to modest, indicating variability in how resilience develops. Among the 487 participants with CYRM data across all timepoints, 8.83% participants (n = 43) consistently scored in the "stable low" group, while 19.9 % participants (n = 99) scored in the "stable high". Notably, 69.4% (n = 345) exhibited changing resilience patterns over time. These findings underscore that resilience is not a static trait but a developmental process that evolves in response to changing contexts and experiences during childhood.

Higher resilience scores were consistently linked to lower mental health difficulties, with significant interaction effects between adversity and resilience. Especially in times of high adversity was the protective effect of resilience particularly pronounced, suggesting that resilience plays a critical role in mitigating the detrimental effects of adversity. The Caregiver

subscale of resilience, reflecting relationships with primary caregivers, was protective across low and high adversity levels, indicating the protective effect of Caregiver resilience regardless of the adversity context. The importance of parental support is further confirmed by maternal resilience as a factor that amplifies the protective role of child resilience in reducing mental health difficulties. This effect was particularly strong at 4.5 years, and not at 6 years, highlighting the dynamic aspect of resilience over time.

Furthermore, caregiver employment status and household income moderated the resilience-mental health relationship, amplifying resilience's protective effects in more stable financial contexts. These effects were of influence at 6 years, and not at 4.5 years, suggesting that socioeconomic influences may become more pronounced as child-rearing costs increase. Maternal education and food security, however, showed no significant interaction effects, suggesting these factors were less influential in this cohort.

Higher levels of the Individual and Contextual subscales of resilience were associated with lower mental health difficulties, particularly for children experiencing high levels of adversity, showcasing the importance of these subscales in times of heightened emotional distress and violence exposure. In particular, emotion regulation difficulties and temperament traits such as negative affect and surgency strengthened the protective effects of resilience, demonstrating its compensatory role in high-risk contexts. No evidence was found for empathy and social cognition as significant moderators. This chapter highlighted resilience as a dynamic process influenced by individual, familial, and socio-economic factors over time. It provided a holistic understanding of resilience and mental health outcomes in high-adversity settings during a critical developmental phase of childhood (5 to 8 years) and emphasized the important role of caregivers and contextual supports at different points in time.

5.2 Discussion of Key Findings

5.2.1 Addressing the Need for Longitudinal and Comprehensive Resilience Research

This thesis highlights a significant gap in longitudinal research on resilience (Chapter 2), emphasizing the importance of directly measuring adversity and how children respond to it (Chapter 3) and situating resilience within a broader mental health framework (Chapter 4).

5.2.1.1 Longitudinal Resilience Research

My scoping review in Chapter 2 revealed a significant lack of longitudinal data on resilience in children aged 10 years and younger in LMICs. Longitudinal research is essential for understanding developmental trajectories of resilience, particularly in these foundational years (Theron et al., 2013; Ungar, 2004). The study in Chapter 4 demonstrated the dynamic nature of resilience in children aged 5-8 years by incorporating multiple resilience measurements over time, revealing varying resilience scores over time. Low correlations across timepoints suggested considerable interindividual differences in resilience trajectories. While the three subscales (Individual, Caregiver, and Contextual Resilience) showed similar patterns of growth over time, this longitudinal research added a significant contribution to the literature by highlighting the protective effects of maternal resilience, caregiver employment, and household income at different developmental stages.

5.2.1.2 Comprehensive Resilience Research

Globally, there is a pressing need for studies that capture the dynamic interplay between resilience, adversity, and mental health outcomes (Mesman et al., 2021; Ungar, 2019), especially in young children from under-resourced and high-risk contexts (Theron, 2023). Findings from my study in Chapter 4 underscore the remarkable ability of young

children, aged 5 to 8 years, to tap into protective mechanisms even at this early age, highlighting the innate and developmental potential for resilience to emerge under challenging circumstances. This finding is particularly critical, given the limited body of research that integrates these dimensions at early developmental stages (Mesman et al., 2021; Zolkoski & Bullock, 2012). My scoping review in Chapter 2 emphasized the need for comprehensive resilience research, incorporating direct measurements of adversity and mental health outcomes. Addressing this gap, my study in Chapter 4 included a newly formed bifactor model for adversity from my study in Chapter 3, exploring children's exposure to violence and emotional distress, to investigate how adversity interacts with resilience and mental health outcomes.

The complexity of the relationships observed, where resilience acts as a mediator between adversity and mental health, reveals that protective mechanisms are not isolated traits but are deeply influenced by environmental, relational, and individual factors. This is in line with findings from a global youth resilience review (Fritz et al., 2018). This intricate interplay demonstrates that even in the face of significant challenges, young children have the capacity to draw on emotional, social, and contextual resources to mitigate the negative impacts of adversity. Furthermore, these findings affirm the need for targeted interventions that foster resilience in young children, particularly by strengthening individual capacities (such as emotion regulation and temperament), relational supports (such as maternal resilience), and broader socio-economic conditions. By providing empirical evidence of resilience as a dynamic and context-dependent process, this research makes a critical contribution to advancing resilience theory and informing future studies on child mental health.

5.2.2 The Crucial Role of Social Support and Caregiver Resilience

In the scoping review in Chapter 2, social support emerged as a critical protective factor for resilience. More specifically, support from family, schools, and local role models were mentioned. Social support becomes particularly salient during developmental transitions when children begin forming new relationships beyond their immediate family, such as with peers, teachers, and community figures (Braet et al., 2014; Sciaraffa et al., 2018).
These findings were further confirmed in my longitudinal study of protective factors that boost resilience in Chapter 4, where the importance of social networks, both familial and peer-based, was underscored as a key factor in relation to positive mental health outcomes. In high-adversity contexts, children who can access peer support and identify local role models demonstrated greater resilience, leveraging these resources to buffer the negative effects of adversity on their mental health. Even in low-adversity settings, the role of caregiver resilience remained essential. Caregiver resilience acted as a foundation for positive mental health outcomes, providing a stable and nurturing base from which children can potentially explore broader social connections.

From a developmental perspective, these findings align with the understanding that children, although still relying heavily on their primary caregiver, also gradually move beyond the sphere of exclusive reliance on maternal or primary caregiver support (DelGiudice, 2018). As children grow, particularly during middle childhood, they increasingly turn to schools, peers, and other relationships for emotional and social support (DelGiudice, 2018). These new relationships become pivotal as children navigate the challenges of forming their identity, developing empathy, and learning to adapt to social norms and expectations (Brown et al., 2024). By placing these findings in a larger developmental framework, this research highlights the evolving nature of social support networks. Early to middle childhood is dominated by the influence of caregivers, but as

children enter school and expand their social circles, they begin to draw on a broader range of protective resources (Brown et al., 2024; Haslam et al., 2019). These insights emphasize the importance of fostering supportive school environments, encouraging positive peer interactions, and strengthening family dynamics, particularly caregiver resilience, to enhance mental health outcomes in children.

5.2.3 The Relationship Between Maternal Resilience and Child Resilience

My findings in Chapter 4 identified maternal resilience as a significant moderator in the relationship between adversity, child resilience, and mental health outcomes, regardless of the adversity level. This is a critical contribution to the literature, addressing a key gap where limited research had not explored this connection (Gavidia-Payne et al., 2015). By confirming the moderating role of maternal resilience, this study provides empirical evidence for what has often been theorized but rarely investigated in practice. This finding builds on the insights from my scoping review in Chapter 2, which highlighted the importance of social support in fostering resilience (Q. Chen et al., 2021; Hildebrand et al., 2019; Massad et al., 2009; Roysircar et al., 2019; Sharp et al., 2018; Yang et al., 2021). Maternal resilience not only supports children directly but is also thought to enhance their access to broader protective resources, such as peer relationships, school environments, and community networks (Gavidia-Payne et al., 2015). This connection underscores the critical interplay between individual resilience (maternal and child) and the broader social support systems within which resilience is developed and maintained. Placing this within the South African context, maternal resilience takes on an even more profound role (Theron, 2020). South Africa's family dynamics often reflect matriarchal structures, where mothers serve as primary caregivers and key pillars of the family unit (Posel et al., 2023). Despite mothers facing significant adversities themselves, such as poverty, unemployment, and community violence,

mothers in this context seem to play a central role in buffering their children from these challenges (Chapter 4). Their ability to navigate hardships while maintaining emotional and practical support for their children reinforces the importance of focusing on maternal resilience in interventions (AliSher et al., 2024; Wakeel, 2024). These findings highlight the culturally and contextually specific nature of resilience in South Africa, where paternal absence and maternal caregiving are often paramount (Posel et al., 2023). By integrating maternal resilience into resilience frameworks, this research underscores the value of addressing both individual and relational dynamics to promote child mental health in high-adversity settings. This contribution not only fills a critical gap in the literature but also provides a foundation for designing interventions that support mothers as a pathway to strengthening child resilience.

5.2.4 Emotion Regulation and Temperament as Moderating Factors

In my scoping review in Chapter 2, five studies identified emotion regulation as a potential protective factor for resilience in young children in LMICs (H. Chen et al., 2021; Domlyn et al., 2020; Ebersöhn et al., 2015; Gülay Ogelman & Önder, 2021; Zhang et al., 2021). This finding is further validated in the longitudinal resilience research in Chapter 4, where emotion regulation emerged as a key moderator, buffering the relationship between resilience and mental health in high-risk contexts. Children with greater emotion regulation difficulties exhibited a stronger association between resilience and positive mental health outcomes. This pattern suggests that during periods of heightened regulation challenges, resilience may exert an even stronger buffering effect on mental health. These results underscore the critical role of individual capacities, particularly in environments marked by high adversity, where emotion regulation can serve as a vital mechanism for mitigating the negative effects of hardship on mental health. Importantly, these findings align with existing

research highlighting the urgent need for accessible psychological interventions aimed at improving emotion regulation skills for children in LMICs (Brown et al., 2024). This is particularly relevant during middle childhood, a crucial developmental period when symptoms of emotional distress often begin to surface, and interventions can have a profound and lasting impact (Brown et al., 2024; DelGiudice, 2018).

This thesis placed a strong emphasis on measuring a child's emotional distress in combination with violence exposure in Chapter 3, which helped shape the resilience framework in Chapter 4, which in turn lead to identification of emotion regulation as a significant moderator of resilience and mental health outcomes. The direct link between assessing emotional distress responses and emotion regulation, within the context of resilience and mental health, represents a ground-breaking contribution to the field. This connection not only deepens our understanding of resilience mechanisms but also highlights critical pathways for intervention in high-adversity settings, where the measurement of children's emotional distress responses can make a crucial impact.

Additionally, temperament was highlighted as another significant individual moderating factor, with traits such as negative affect and surgency moderating the resilience-mental health relationship. Specifically, children with higher emotional reactivity or impulsivity demonstrated a stronger protective effect of resilience during high levels of adversity, suggesting that resilience may compensate for these traits by providing children with tools to better navigate emotional or behavioural challenges (Rydell et al., 2003, 2007). In a global context, links between these individual factors and resilience are often indirect or theoretical (Zolkoski & Bullock, 2012). However, this research builds upon these foundations by providing empirical evidence of resilience pathways. By integrating individual capacities like emotion regulation and temperament into models of resilience, this study establishes a

clearer understanding of how these factors interact with adversity, and especially a child's emotional response to adversity, to shape mental health outcomes. The findings highlight the adaptive potential of young children in high-risk contexts, demonstrating their capacity to access and utilize individual protective mechanisms in the face of adversity. These insights reinforce the importance of fostering individual-level capacities early in life, particularly in interventions aimed at enhancing resilience and reducing mental health difficulties in structurally disadvantaged settings (Masten et al., 2021).

5.2.5. The Role of Contextual Factors in Resilience

Our findings from the longitudinal resilience research in Chapter 4 highlight the significant role of contextual factors in shaping resilience, particularly under conditions of high adversity. Specifically, children in this study demonstrated access to spiritual and religious examples, as well as broader cultural resources like community support and education (as measured by the Contextual resilience subscale), which provided critical protective mechanisms. This is a notable contribution, as it addresses a gap in the literature on resilience, especially within the South African context and among young children (van Breda & Theron, 2018). Previous resilience research in South Africa has largely overlooked the influence of spiritual, religious, and cultural factors on children's capacity to cope with adversity (van Breda & Theron, 2018), making this an important area for future investigation.

Additionally, this research confirmed the significance of caregiver employment and household income at 6 years as key contextual moderators of resilience. In line with findings from the scoping review in Chapter 2, higher household income and caregiver employment status were associated with stronger protective effects of resilience on mental health outcomes (Christodoulou et al., 2022; Rotheram-Borus et al., 2019). These factors likely enhance access to resources, reduce stress within the home environment, and enable children

to draw on both individual and external resilience mechanisms more effectively. The importance of these findings lies in their alignment with the broader resilience literature (Christodoulou et al., 2022), which emphasizes the role of economic and social stability in buffering the effects of adversity. For children in high-risk settings, access to economic security through caregiver employment and higher household income creates a foundation upon which other protective factors, such as social and community support, can operate more effectively. By situating these findings within the South African sociocultural context, this research underscores the multifaceted nature of resilience, demonstrating how individual, relational, and contextual factors interact to shape outcomes. These insights emphasize the importance of contextually relevant approaches in resilience research and interventions, focusing not only on the child but also on the broader environmental and cultural systems that support their development (Ungar, 2013).

5.3. Implications for Policies and Procedures

The findings from this thesis align with a broader framework around mental health care in the Western Cape, South Africa, and Sub-Saharan LMICs more broadly. Access to effective mental health care in LMICs remains limited, with South Africa having only 15-20 child and adolescent psychiatrists in the public healthcare system (Mokitimi et al., 2022; Simelane et al., 2022), and countries like Zimbabwe (Chibanda et al., 2015), Ghana, Uganda, and Zambia (Kleintjes et al., 2010) reporting similarly low numbers. Despite these challenges, there is growing evidence supporting a range of interventions suited for LMICs, from specialist-led approaches such as psychotherapy and pharmacological treatments, to low-cost, scalable interventions like psychoeducation, meditation, and dietary supplementation (Ribeiro et al., 2023). Importantly, interventions delivered by non-specialized professionals or laypersons have demonstrated effectiveness, offering a promising

avenue for implementation in resource-limited settings (Ribeiro et al., 2023). This thesis contributed to this framework by identifying key factors that can enhance mental health outcomes in young children under the age of 10 from structurally disadvantaged contexts. Specifically, it highlights the importance of fostering emotion regulation skills (Brown et al., 2024) and cultivating caregiver resilience (AliSher et al., 2024; Wakeel, 2024) in high-risk contexts. On a larger scale, these thesis' findings reinforce the urgent need to address systemic issues such as poverty, unemployment, and violence exposure, which have profound and detrimental effects on child development. Governments must prioritize structural interventions to protect the next generation of change-makers and ensure a healthier, more resilient future for children in high-risk contexts (Haslam et al., 2019).

In addition to large-scale policy responses, frontline systems that regularly engage with children, such as schools and child protection services, play a critical role in fostering resilience. Teachers, social workers, and school-based support staff are often the first to notice signs of psychological distress or socio-emotional vulnerability and can provide crucial support or referrals (Fazel et al., 2014). Equipping these professionals with training in trauma-informed care and resilience-building strategies is essential for early identification and intervention, especially since schools in high-risk contexts are not always perceived as safe spaces by children (Theron, 2023). Furthermore, embedding mental health promotion and socio-emotional learning within the education system can create safe, supportive environments that buffer against adversity and promote long-term wellbeing (Basu et al., 2022). Schools and social services are not only key sites for implementation but also important platforms for building relationships, modeling resilience, and connecting families with broader community resources (Fazel et al., 2014; Fritz et al., 2018).

Encouragingly, the South African National Mental Health Policy Framework and Strategic Plan (2023–2030)[7] recognises the need to place mental health promotion and prevention at the centre of national efforts. The policy advocates for integrating mental health into general health services and embedding mental health initiatives across sectors, including education and social development (Shisana et al., 2024). However, to translate this policy vision into lived impact, actionable, grassroots-level implementation is critical. Community-based organisations (CBOs) are a gateway to effectively deliver child-focused, resilience-building programmes by trained lay facilitators in under-resourced communities. These task-shifted models, which draw on local capacity and contextual relevance, are essential to bridging the mental health service gap in middle childhood and can benefit greatly from the findings from this thesis.

5.4 Strengths and Limitations

5.4.1 Caregiver Report of Main Outcomes

A major strength of this thesis lies in its focus on an underrepresented and under-researched age group, providing valuable insights into developmental pathways during early to middle childhood. The inclusion of children up to 8 years old allowed for the exploration of resilience and mental health outcomes in a critical developmental period. However, given the young age of the participants, all measures relied on maternal/caregiver-reported data, which may have introduced social desirability bias or recall errors. For instance, caregivers might underreport their child's exposure to violence or emotional distress, particularly in contexts where stigma or fear of judgment are prevalent. Reports from the DCHS cohort on Intimate Partner Violence (IPV) indicated high levels of antenatal IPV (34%) and postnatal

[7] Published by the Department of Health, Republic of South Africa, retrieved on 21st of May 2025 via https://www.health.gov.za/wp-content/uploads/2024/02/National-Mental-Health-Policy-framework-and-strategic-Plan-2023-2030.pdf

IPV (27%; Barnett et al., 2022). However, our findings in Chapter 3 report low levels of children witnessing domestic violence. While it is possible that young children were not frequently exposed to such trauma, there is also a chance of underreporting. Often, there is also a normalization of trauma due to its extreme prevalence in South Africa which may lead caregivers to perceive certain experiences as less severe or not worth reporting (Kaminer & Eagle, 2010)

Additionally, many questions in the CYRM Caregiver subscale were related to caregiving practices, which could have influenced caregivers to provide more favourable responses about their own behaviour rather than answering from the child's perspective. This reliance on caregiver reports highlights a limitation in capturing the child's direct experiences. Future research could address this by incorporating multiple informants, such as teachers or other community members, particularly for school-aged children. Over time, self-report measures could also be included to provide a more comprehensive understanding of resilience in older children. While the CYRM self-report is designed for children as young as 5 years old, a pilot study conducted within the DCHS cohort with 5.5-year-old participants revealed significant difficulties in comprehension and response, rendering the self-report measure unusable at that age. Although self-reporting is planned for a later stage in the DCHS cohort, it was outside the scope of this thesis. Future studies could revisit this approach at older ages to supplement caregiver-reported data and further enrich the understanding of resilience in young children.

5.4.2 Attrition

The DCHS encountered some challenges with participant retention over time, which may have impacted the generalizability of findings and reduced statistical power. Attrition is a common issue in longitudinal research, particularly in high-risk contexts, where factors

such as mobility, socioeconomic instability, and systemic barriers often disrupt participation. Of the original cohort, only 163 participants were lost to follow-up (i.e., inactive), resulting in an active sample of 980 participants, showcasing high retention. While the characteristics of the active and inactive samples were largely similar, some differences were observed in terms of household income and maternal education. Participants from the inactive sample tended to have higher household income and greater levels of maternal education compared to those remaining in the study. These discrepancies may have introduced bias, potentially leading to an overestimation or underestimation of the associations between resilience and mental health outcomes. This is particularly relevant given that household income, a significant moderator in the resilience framework, was among the contextual factors that could influence these associations. The DCHS has done really well in terms of retention rate, using different retention strategies like phone-call reminders, face-to-face reminders (home visits), and incentives (Barnett et al., 2016). Future research could consider even more strategies to minimize attrition and account for its potential impact on longitudinal findings in high-adversity contexts (Teague et al., 2018).

5.4.3 Confounding Influences

Another significant strength of this thesis lies in the use of an extensive framework to model resilience, incorporating individual, relational, and contextual perspectives. This wide-ranging approach allowed for a nuanced understanding of resilience pathways. However, it is important to note that many additional factors can influence the development of resilience, such as genetic and biological factors (Boyce et al., 2021), which were beyond the scope of this thesis. The reliance on data from a longitudinal birth cohort also posed certain limitations. Specifically, I was constrained to using variables that were measured within the study, which restricted the selection of factors included in the analyses. Other variables such

as parenting practices, caregiver mental health, school performance, and community-level support may have played a role in shaping resilience and mental health outcomes but could not be accounted for in this thesis since modelling would become overly complex.

While this thesis adopted a dynamic and systemic definition of resilience in line with contemporary literature, the operationalization was limited to protective factors measured by the CYRM. This represented only one part of the broader resilience system. Following Kalisch et al. (2017), resilience can be understood as comprising resilience mechanisms (protective factors), resilience processes (the dynamic interaction of adversity and protection over time), and resilience outcomes (observable adaptation or wellbeing in the face of adversity). The CYRM assessed protective factors but does not capture the processual or outcome components. Future research should aim to include repeated measurements of adversity and adjustment outcomes in order to fully assess resilience as a dynamic system and process. It should also aim to to incorporate these additional above-mentioned measures to provide an even broader perspective on resilience and its determinants. By doing so, future studies could explain a greater proportion of the variance in resilience and mental health outcomes, offering a more holistic understanding of the factors that contribute to resilience, particularly in high-adversity contexts.

5.4.4 Limitation of the Bifactor Model

While the bifactor model used to construct the AERM framework demonstrated the best fit among the tested models (based on CFI, TLI, RMSEA, and SRMR), it is important to note that bifactor models often exhibit superior fit due to their proportionality constraints, rather than necessarily reflecting a more accurate theoretical structure (F. F. Chen et al., 2012; Gignac, 2016; Markon, 2019). This raises concerns about potential overfitting and model interpretability. Additionally, the general adversity factor (AERM) in the bifactor

model combined indicators of both violence exposure and emotional distress response, which are conceptually distinct. Although the integration of these dimensions moves beyond summative adversity indices such as ACE scores, low item loadings and weak correlations between these indicators suggested that they may not be capturing a single coherent latent construct.

Furthermore, while the bifactor model included four subscales (Emotional Response, Fearful, Acting Out, and Witnessing Community Violence), a detailed interpretation of the unique variance captured by each was outside the scope of the current study. Future research would benefit from a more in-depth exploration of these specific factors and their link to childhood resilience over time. The primary aim of this thesis, however, was to move beyond merely documenting exposure to violence and emotional distress, and to interrogate the assumption that such exposures are uniformly emotionally impactful. By including emotional stress response as part of the model, this thesis sought to examine whether and how children's subjective experiences of adversity may diverge from objective exposure, and how these nuances relate to resilience and further developmental outcomes.

5.4.5 Generalisability of Findings

This thesis was conducted in a single sub-district in South Africa, focusing on two low-income, peri-urban communities. While these communities are representative of informal or sub-standard housing with high levels of environmental risk factors—such as exposure to smoking, HIV, trauma, and depression—they do not necessarily reflect the broader Southern African population. Although the study provided valuable insights into resilience within high-risk South African townships, the findings may not fully generalize to other cultural or socio-economic contexts, including urban or rural populations beyond South Africa. Importantly, the unique roots and nature of violence in South Africa, shaped by its

specific historical and socio-political context, may limit the direct applicability of these findings to other LMICs. For example, forms of violence prevalent in these communities, such as community violence, gang-related violence, gun use, and homicide, are particularly pronounced in South Africa. As such, while this research sheds light on critical resilience pathways in high-adversity settings, caution must be exercised in extrapolating these findings to other contexts of lower adversity where the nature and drivers of violence may differ. However, due to common structural and economic challenges faced by many LMICs, these findings remain highly applicable and can provide valuable insights for comparable contexts.

5.5 Conclusion

The key findings of this thesis highlight that children growing up in structurally disadvantaged circumstances possess the ability to tap into critical resources that can boost their mental health outcomes. This work provides a comprehensive exploration of resilience during preschool to middle childhood, particularly within high-adversity contexts and an underrepresented population.

More specifically, this thesis contributes the flowing novel approaches and results to the field of resilience and mental health:

1. Existing evidence on protective factors that boost resilience in children aged 10 years and younger in LMICs was reviewed, revealing significant gaps in research.
2. A novel approach to assessing childhood adversity was introduced through the formation of a bifactor model, integrating two existing measures to account for children's emotional distress response to violence exposure.
3. The dynamic nature of childhood resilience has been investigated, using a comprehensive framework of childhood adversity and emotional responses, resilience, moderating factors, and mental health outcomes.

a. This resilience framework indicated that resilience trajectories varied across individuals, with consistently higher resilience linked to lower mental health difficulties in high-adversity contexts.
b. Individual, Caregiver, and Contextual resilience all contributed to the buffering effect of resilience on mental health outcomes in high-adversity settings, while Caregiver Resilience also played a key role in lower-adversity contexts.
c. Emotion regulation and child temperament emerges as key moderators in the resilience-mental health relationship.
d. Maternal resilience at 4.5 years, and caregiver employment and household income at 6 years were identified as critical moderators in shaping the relationship between resilience and mental health outcomes.

Ensuring improved access to mental health resources for children and their caregivers in these communities should be an immediate priority in South Africa and other LMICs, as these resources play a pivotal role in fostering resilience. Future research should build on these insights to refine resilience frameworks and develop more targeted, effective strategies to support vulnerable children and their families. With 75% of children already exposed to community violence at a young age and many trapped in the cycle of poverty, efforts to strengthen resilience and promote adaptive coping mechanisms are essential. By investing in their capacity to navigate adversity and adapt positively to life's challenges, we can help lay the foundation for a better future—not only for these children but for the next generation as a whole.

References

Abravanel, B. T., & Sinha, R. (2015). Emotion dysregulation mediates the relationship between lifetime cumulative adversity and depressive symptomatology. *Journal of Psychiatric Research*, *61*, 89–96. https://doi.org/10.1016/j.jpsychires.2014.11.012

AliSher, A. N., Atta, S., Yaqoob, A., Ahmed, T., & Meherali, S. (2024). A concept analysis of maternal resilience against pregnancy-related mental health challenges in low- and middle-income countries. *Healthcare*, *12*(16), 1555. https://doi.org/10.3390/healthcare12161555

Amaya-Jackson, L. (1998). *Child exposure to violence checklist. Adapted from Richter's Things I've seen and heard*. (Unpublished instrument) Trauma evaluation, treatment & research program, Center for Child & Family Health, Durham, NC.

Atilola, O. (2015). Cross-cultural child and adolescent psychiatry research in developing countries. *Global Mental Health*, *2*. https://doi.org/10.1017/gmh.2015.8

Barbarin, O. A., Richter, L., & DeWet, T. (2001). Exposure to violence, coping resources, and psychological adjustment of South African children. *American Journal of Orthopsychiatry*, *71*(1), 16–25. https://doi.org/10.1037/0002-9432.71.1.16

Barnett, W., Brittain, K., Sorsdahl, K., Zar, H. J., & Stein, D. J. (2016). Maternal participant experience in a South African birth cohort study enrolling healthy pregnant women and their infants. *Philosophy, Ethics, and Humanities in Medicine*, *11*(1), 3. https://doi.org/10.1186/s13010-016-0036-2

Barnett, W., Nhapi, R., Zar, H. J., Halligan, S. L., Pellowski, J., Donald, K. A., & Stein, D. J. (2022). Intimate partner violence and growth outcomes through infancy: A longitudinal investigation of multiple mediators in a South African birth cohort. *Maternal and Child Nutrition*, *18*(1), 1–12. https://doi.org/10.1111/mcn.13281

Barnett, W., Pellowski, J., Kuo, C., Koen, N., Donald, K. A., Zar, H. J., & Stein, D. J. (2019).

Food-insecure pregnant women in South Africa: A cross-sectional exploration of maternal depression as a mediator of violence and trauma risk factors. *BMJ Open*, *9*(3), e018277. https://doi.org/10.1136/bmjopen-2017-018277

Baron-Cohen, S. (2001). Theory of mind in normal development and autism. *Prisme*, *34*(1), 74–183. https://neurofeedback.io/wp-content/uploads/2023/10/SBaronCohen2001Theory_of_Mind_in_normal_development_and_autism.pdf

Basu, D., Nagpal, S., Pillai, R. R., Mutiso, V., Ndetei, D., & Bhui, K. (2022). Building youth and family resilience for better mental health: developing and testing a hybrid model of intervention in low- and middle-income countries. *The British Journal of Psychiatry*, *220*(1), 4–6. https://doi.org/10.1192/bjp.2021.129

Bender, A. E., McKinney, S. J., Schmidt-Sane, M. M., Cage, J., Holmes, M. R., Berg, K. A., Salley, J., Bodell, M., Miller, E. K., & Voith, L. A. (2022). Childhood exposure to intimate partner violence and effects on social-emotional competence: A systematic review. *Journal of Family Violence*, *37*(8), 1263–1281. https://doi.org/10.1007/s10896-021-00315-z

Bhana, A., & Bachoo, S. (2011). The determinants of family resilience among families in low- and middle-income contexts: A systematic literature review. *South African Journal of Psychology*, *41*(2), 131–139. https://doi.org/10.1177/008124631104100202

Bhushan, B., & Sathya Kumar, J. (2009). Emotional distress and posttraumatic stress in children: The impact of direct versus indirect exposure. *Journal of Loss and Trauma*, *14*(1), 35–45. https://doi.org/10.1080/15325020802537047

Bickel, G., Nord, M., Price, C., Hamilton, W., & Cook, J. (2000). *Guide to measuring household food security, revised 2000*. United States Department of Agriculture. https://ageconsearch.umn.edu/record/337157/?v=pdf

Bonanno, G. A. (2004). Loss, trauma, and human resilience: Have we underestimated the human capacity to thrive after extremely aversive events? *American Psychologist*, *59*(1), 20–28. https://doi.org/10.1037/0003-066X.59.1.20

Bonanno, G. A., & Diminich, E. D. (2013). Annual research review: Positive adjustment to adversity - Trajectories of minimal-impact resilience and emergent resilience. *Journal of Child Psychology and Psychiatry and Allied Disciplines*, *54*(4), 378–401. https://doi.org/10.1111/jcpp.12021

Boyce, W. T. (2016). Differential susceptibility of the developing brain to contextual adversity and stress. *Neuropsychopharmacology*, *41*(1), 142–162. https://doi.org/10.1038/npp.2015.294

Boyce, W. T., Levitt, P., Martinez, F. D., McEwen, B. S., & Shonkoff, J. P. (2021). Genes, environments, and time: The biology of adversity and resilience. *Pediatrics*, *147*(2). https://doi.org/10.1542/peds.2020-1651

Braet, C., Prins, P., & Bijttebier, P. (2014). Ontwikkeling en psychopathologie. In P. Prins & C. Braet (Eds.), *Handboek klinische ontwikkelingspsychologie* (pp. 3–56). Springer. https://doi.org/10.1007/978-90-368-0495-0_1

Brittain, K., Myer, L., Koen, N., Koopowitz, S., Donald, K. A., Barnett, W., Zar, H. J., & 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), 504–514. https://doi.org/10.1111/ppe.12216

Bronfenbrenner, U., & Morris, P. A. (2006). The bioecological model of human development. In R. M. Lerner & W. Damon (Eds.), *Handbook of child psychology: Theoretical models of human development* (6th ed., pp. 793–828). Wiley.

Brown, F. L., Lee, C., Servili, C., Willhoite, A., Van Ommeren, M., Hijazi, Z., Kieselbach, B., & Skeen, S. (2024). Psychological interventions for children with emotional and

behavioral difficulties aged 5–12 years: An evidence review. *Cambridge Prisms: Global Mental Health*, *11*, e75. https://doi.org/10.1017/gmh.2024.57

Burgermeister, D. (2007). Childhood adversity: A review of measurement instruments. *Journal of Nursing Measurement*, *15*(3), 163–176. https://doi.org/10.1891/106137407783095766

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 Traumatic Stress*, *20*(6), 1019–1028. https://doi.org/10.1002/jts.20271

Cartwright, K., El-Khani, A., Subryan, A., & Calam, R. (2015). Establishing the feasibility of assessing the mental health of children displaced by the Syrian conflict. *Global Mental Health*, *2*. https://doi.org/10.1017/gmh.2015.3

Chen, F. F., Hayes, A., Carver, C. S., Laurenceau, J. P., & Zhang, Z. (2012). Modeling general and specific variance in multifaceted constructs: A comparison of the bifactor model to other approaches. *Journal of Personality*, *80*(1), 219–251. https://doi.org/10.1111/j.1467-6494.2011.00739.x

Chen, H., Hong, Q., Xu, J., Liu, F., Wen, Y., & Gu, X. (2021). Resilience coping in preschool children: The role of emotional ability, age, and gender. *International Journal of Environmental Research and Public Health*, *18*(9). https://doi.org/10.3390/ijerph18095027

Chen, Q., Gao, W., Chen, B. Bin, Kong, Y., Lu, L., & Yang, S. (2021). Ego-resiliency and perceived social support in late childhood: A latent growth modeling approach. *International Journal of Environmental Research and Public Health*, *18*(6), 1–12. https://doi.org/10.3390/ijerph18062978

Chibanda, D., Bowers, T., Verhey, R., Rusakaniko, S., Abas, M., Weiss, H. A., & Araya, R.

(2015). The Friendship Bench programme: A cluster randomised controlled trial of a brief psychological intervention for common mental disorders delivered by lay health workers in Zimbabwe. *International Journal of Mental Health Systems*, *9*, 1–7. https://doi.org/10.1186/s13033-015-0013-y

Christodoulou, J., Rotheram-Borus, M. J., Hayati Rezvan, P., Comulada, W. S., Stewart, J., Almirol, E., & Tomlinson, M. (2022). Where you live matters: Township neighborhood factors important to resilience among south African children from birth to 5 years of age. *Preventive Medicine*, *157*, 106966. https://doi.org/10.1016/j.ypmed.2022.106966

Cluver, L., & Gardner, F. (2007). Risk and protective factors for psychological well-being of children orphaned by AIDS in Cape Town: A qualitative study of children and caregivers' perspectives. *AIDS Care*, *19*(3), 318–325. https://doi.org/10.1080/09540120600986578

Collishaw, S., Gardner, F., Lawrence Aber, J., & 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. https://doi.org/10.1007/s10802-015-0068-x

Connor, K. M., & Davidson, J. R. T. (2003). Development of a new resilience scale: The Connor-Davidson resilience scale (CD-RISC). *Depression and Anxiety*, *18*(2), 76–82. https://doi.org/10.1002/da.10113

Cook, C. J., Howard, S. J., Cuartas, J., Makaula, H., Merkley, R., Mshudulu, M., Tshetu, N., Scerif, G., & Draper, C. E. (2022). Child exposure to violence and self-regulation in South African preschool-age children from low-income settings. *Child Abuse and Neglect*, *134*, 105944. https://doi.org/10.1016/j.chiabu.2022.105944

Cooper, D. K., & Nickodem, K. (2021). Cumulative lifetime adversity in a national sample of Hispanic/Latino immigrants: Exploring construct validity across six Hispanic/Latino

groups using data from the HCHS/SOL sociocultural ancillary study. *Evaluation & the Health Professions*, *44*(4), 348–361. https://doi.org/10.1177/0163278720910470

Coren, M. A., Anderson, N. P., Feldman, J. A., Rachel, V. C., Kolko, D. J., & Lindhiem, O. (2023). National norms and percentiles for the pediatric emotional distress scale. *Journal of Child and Adolescent Trauma*, *16*(3), 589–596. https://doi.org/10.1007/s40653-023-00519-z

Cosco, T. D., Kaushal, A., Hardy, R., Richards, M., Kuh, D., & Stafford, M. (2017). Operationalising resilience in longitudinal studies: A systematic review of methodological approaches. *Journal of Epidemiology and Community Health*, *71*(1), 98–104. https://doi.org/10.1136/jech-2015-206980

Daniel, B. (2010). Concepts of adversity, risk, vulnerability, and resilience: A discussion in the context of the 'child protection system.' *Social Policy and Society*, *9*(2), 231–241. https://doi.org/10.1017/s1474746409990364

Decrop, R., Nowalis, S., Yannon, M., McGraw, J., & Docherty, M. (2024). Unveiling hidden dimensions: A novel bifactor approach to unraveling adverse childhood experiences. *Child Abuse and Neglect*, *147*, 106599. https://doi.org/10.1016/j.chiabu.2023.106599

DelGiudice, M. (2018). Middle childhood: An evolutionary-developmental synthesis. In N. Halfon, C. B. Forrest, R. M. Lerner, & E. M. Faustman (Eds.), *Handbook of life course health development* (pp. 95–107). Springer. https://doi.org/10.1007/978-3-319-47143-3_6

Ding, X., Liang, M., Song, Q., Su, W., Li, N., Liu, H., Wu, Y., Guo, X., Wang, H., Zhang, J., Qin, Q., Sun, L., Chen, M., & Sun, Y. (2022). Development of psychological resilience and associations with emotional and behavioral health among preschool left-behind children. *Social Psychiatry and Psychiatric Epidemiology*, *58*, 467–476. https://doi.org/10.1007/s00127-022-02325-8

Domlyn, A. M., Jiang, Y., Harrison, S., Qiao, S., & Li, X. (2020). Stigma and psychosocial wellbeing among children affected by parental HIV in China. *AIDS Care*, *32*(4), 500–507. https://doi.org/10.1080/09540121.2019.1687834

Donald, K. A., Hoogenhout, M., Du Plooy, C. P., Wedderburn, C. J., Nhapi, R. T., Barnett, W., Hoffman, N., Malcolm-Smith, S., Zar, H. J., & Stein, D. J. (2018). Drakenstein Child Health Study (DCHS): Investigating determinants of early child development and cognition. *BMJ Paediatrics Open*, *2*(1), 1–9. https://doi.org/10.1136/bmjpo-2018-000282

Donald, K. A., Wedderburn, C. J., Barnett, W., Nhapi, R. T., Rehman, A. M., Stadler, J. A. M., Hoffman, N., Koen, N., Zar, H. J., & Stein, D. J. (2019). Risk and protective factors for child development: An observational South African birth cohort. *PLOS Medicine*, *16*(9), 1–20. https://doi.org/10.1371/journal.pmed.1002920

Downs, S. H., & Black, N. (1998). The feasibility of creating a checklist for the assessment of the methodological quality both of randomised and non-randomised studies of health care interventions. *Journal of Epidemiology and Community Health*, *52*(6), 377–384. https://doi.org/10.1136/jech.52.6.377

Draper, C. E., Cook, C. J., Howard, S. J., Makaula, H., Merkley, R., Mshudulu, M., Tshetu, N., & Scerif, G. (2023). Caregiver perspectives of risk and protective factors influencing early childhood development in low-income, urban settings: A social ecological perspective. *Infant and Child Development*, *32*(3), 1–22. https://doi.org/10.1002/icd.2417

Dückers, M. L. A., Alisic, E., & Brewin, C. R. (2016). A vulnerability paradox in the cross-national prevalence of post-traumatic stress disorder. *British Journal of Psychiatry*, *209*(4), 300–305. https://doi.org/10.1192/bjp.bp.115.176628

Ebersöhn, L., Eloff, I., Finestone, M., Grobler, A., & Moen, M. (2015). Telling stories and

adding scores: Measuring resilience in young children affected by maternal HIV and AIDS. *African Journal of AIDS Research*, *14*(3), 219–227. https://doi.org/10.2989/16085906.2015.1052822

Eisenberg, N., Spinrad, T. L., & Eggum, N. D. (2010). Emotion-related self-regulation and its relation to children's maladjustment. *Annual Review of Clinical Psychology*, *6*, 495–525. https://doi.org/10.1146/annurev.clinpsy.121208.131208

Ellis, B. J., Abrams, L. S., Masten, A. S., Sternberg, R. J., Tottenham, N., & Frankenhuis, W. E. (2022). Hidden talents in harsh environments. *Development and Psychopathology*, *34*(1), 95–113. https://doi.org/10.1017/S0954579420000887

Ellis, B. J., Essex, M. J., & Boyce, W. T. (2005). Biological sensitivity to context: II. Empirical explorations of an evolutionary-developmental theory. *Development and Psychopathology*, *17*(2), 303–328. https://doi.org/10.1017/S0954579405050157

Eloff, I., Finestone, M., Makin, J. D., Boeving-Allen, A., Visser, M., Ebersöhn, L., Ferreira, R., Sikkema, K. J., Briggs-Gowan, M. J., & Forsyth, B. W. C. (2014). A randomized clinical trial of an intervention to promote resilience in young children of HIV-positive mothers in South Africa. *AIDS*, *28*(3), S347–S357. https://doi.org/10.1097/qad.0000000000000335

Engle, P. L., & Black, M. M. (2008). The effect of poverty on child development and educational outcomes. *Annals of the New York Academy of Sciences*, *1136*, 243. https://doi.org/10.1196/annals.1425.023

Evans, G. W., Li, D., & Whipple, S. S. (2013). Cumulative risk and child development. *Psychological Bulletin*, *139*(6), 1342. https://doi.org/10.1037/a0031808

Fazel, M., Patel, V., Thomas, S., & Tol, W. (2014). Mental health interventions in schools in low-income and middle-income countries. *The Lancet Psychiatry*, *1*(5), 388–398. https://doi.org/10.1016/S2215-0366(14)70357-8

Fergus, S., & Zimmerman, M. A. (2005). Adolescent resilience: A framework for understanding healthy development in the face of risk. *Annual Review of Public Health*, *26*(1), 399–419. https://doi.org/10.1146/annurev.publhealth.26.021304.144357

Field, A. (2009). *Discovering statistics using SPSS: Book plus code for E version of text*. Sage.

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. https://doi.org/10.1016/j.comppsych.2008.09.001

Finkelhor, D., Turner, H. A., Shattuck, A., & Hamby, S. L. (2015). Prevalence of childhood exposure to violence, crime, and abuse: Results from the National Survey of Children's Exposure to Violence. *JAMA Pediatrics*, *169*(8), 746–754. https://doi.org/10.1001/jamapediatrics.2015.0676

Fisher, H. L., Bunn, A., Jacobs, C., Moran, P., & Bifulco, A. (2011). Concordance between mother and offspring retrospective reports of childhood adversity. *Child Abuse and Neglect*, *35*(2), 117–122. https://doi.org/10.1016/j.chiabu.2010.10.003

Fogarty, A., Wood, C. E., Giallo, R., Kaufman, J., & Hansen, M. (2019). Factors promoting emotional-behavioural resilience and adjustment in children exposed to intimate partner violence: A systematic review. *Australian Journal of Psychology*, *71*(4), 375–389. https://doi.org/10.1111/ajpy.12242

Francis, D., & Webster, E. (2019). Poverty and inequality in South Africa: Critical reflections. *Development Southern Africa*, *36*(6), 788–802. https://doi.org/10.1080/0376835X.2019.1666703

Fritz, J., de Graaff, A. M., Caisley, H., van Harmelen, A. L., & Wilkinson, P. O. (2018). A systematic review of amenable resilience factors that moderate and/or mediate the relationship between childhood adversity and mental health in young people. *Frontiers*

in Psychiatry, *9*, 1–17. https://doi.org/10.3389/fpsyt.2018.00230

Fuentes-Balderrama, J., Castillo, C. C. Del, Parra-Cardona, J. R., Plaza, B. T., García, A. O., & Díaz-Loving, R. (2020). Parental practices and maternal warmth as protective factors for problem behaviors in Mexican preadolescents. *Journal of Sociology and Social Welfare*, *47*(2), 59–81. https://doi.org/10.15453/0191-5096.4369

Gadari, S., Farokhzadian, J., & Mangolian shahrbabaki, P. (2022). Effectiveness of resilience training on social self-efficacy of the elementary school girls during COVID-19 outbreak. *Clinical Child Psychology and Psychiatry*, *27*(1), 308–319. https://doi.org/10.1177/13591045211056504

Gavidia-Payne, S., Denny, B., Davis, K., Francis, A., & Jackson, M. (2015). Parental resilience: A neglected construct in resilience research. *Clinical Psychologist*, *19*(3), 111–121. https://doi.org/10.1111/cp.12053

Gignac, G. E. (2016). The higher-order model imposes a proportionality constraint: That is why the bifactor model tends to fit better. *Intelligence*, *55*, 57–68. https://doi.org/10.1016/j.intell.2016.01.006

Giordano, P. (2010). *Legacies of crime: A follow-up of the children of delinquent girls and boys*. Cambridge University Press.

Goldstein, S., & Brooks, R. (2013). The continuing study of resilience in times of a pandemic: This is why we study childhood resilience. In S. Goldstein & R. B. Brooks (Eds.), *Handbook of resilience in children* (2nd ed., pp. 3–14). Springer Science. https://doi.org/10.1007/978-3-031-14728-9_1

Goodman, A., Fleitlich-Bilyk, B., Patel, V., & Goodman, R. (2007). Child, family, school and community risk factors for poor mental health in Brazilian schoolchildren. *Journal of the American Academy of Child & Adolescent Psychiatry*, *46*(4), 448–456. https://doi.org/10.1097/chi.0b013e31803065b5

Gordon, C. (2020). *The role of enterprise development in the reduction of poverty: A case study of Drakenstein Municipality in the Western Cape*. (Master's dissertation), Faculty of Business, Cape Peninsula University of Technology, South Africa. https://etd.cput.ac.za/handle/20.500.11838/4024

Gucciardi, D. F., Jackson, B., Coulter, T. J., & Mallett, C. J. (2011). The Connor-Davidson Resilience Scale (CD-RISC): Dimensionality and age-related measurement invariance with Australian cricketers. *Psychology of Sport and Exercise*, *12*(4), 423–433. https://doi.org/10.1016/j.psychsport.2011.02.005

Gülay Ogelman, H., Gündoğan, A., Erten Sarıkaya, H., & Erol, A. (2016). Teacher ratings of resilience and peer relationships of preschoolers whose fathers died unexpectedly. *Death Studies*, *40*(7), 414–418. https://doi.org/10.1080/07481187.2016.1159260

Gülay Ogelman, H., & Önder, A. (2021). Emotional regulation strategies of 5–6-year-old children and their levels of resiliency. *Early Child Development and Care*, *191*(2), 221–229. https://doi.org/10.1080/03004430.2019.1613650

Gustafsson, J.-E., & Balke, G. (1993). General and specific abilities as predictors of school achievement. *Multivariate Behavioral Research*, *28*(4), 407–434. https://doi.org/10.1207/s15327906mbr2804_2

Hamai, T. A., & Felitti, V. J. (2022). Adverse childhood experiences: Past, present, and future. In R. Geffner, J. W. White, L. K. Hamberger, A. Rosenbaum, V. Vaughan-Eden, & V. I. Vieth (Eds.), *Handbook of Interpersonal Violence and Abuse Across the Lifespan: A project of the National Partnership to End Interpersonal Violence Across the Lifespan (NPEIV)* (pp. 97–120). Springer. https://doi.org/10.1007/978-3-319-89999-2_305

Harris, P. A., Taylor, R., Minor, B. L., Elliott, V., Fernandez, M., O'Neal, L., McLeod, L., Delacqua, G., Delacqua, F., & Kirby, J. (2019). The REDCap consortium: Building an

international community of software platform partners. *Journal of Biomedical Informatics*, *95*, 103208. https://doi.org/10.1016/j.jbi.2019.103208

Harris, P. A., Taylor, R., Thielke, R., Payne, J., Gonzalez, N., & Conde, J. G. (2009). Research electronic data capture (REDCap)— A metadata-driven methodology and workflow process for providing translational research informatics support. *Journal of Biomedical Informatics*, *42*(2), 377–381. https://doi.org/10.1016/j.jbi.2008.08.010

Haslam, D., Mejia, A., Thomson, D., & Betancourt, T. (2019). Self-regulation in low-and middle-income countries: Challenges and future directions. *Clinical Child and Family Psychology Review*, *22*(1), 104–117. https://doi.org/10.1007/s10567-019-00278-0

Hildebrand, N. A., Celeri, E. H. R. V., Morcillo, A. M., & Zanolli, M. de L. (2019). Resilience and mental health problems in children and adolescents who have been victims of violence. *Revista de Saude Publica*, *53*(1), 1–14. https://doi.org/10.11606/S1518-8787.2019053000391

Hillis, S., Mercy, J., Amobi, A., & Kress, H. (2016). Global prevalence of past-year violence against children: A systematic review and minimum estimates. *Pediatrics*, *137*(3), e20154079. https://doi.org/10.1542/peds.2015-4079

Hong, Q. N., Fàbregues, S., Bartlett, G., Boardman, F., Cargo, M., Dagenais, P., Gagnon, M. P., Griffiths, F., Nicolau, B., O'Cathain, A., Rousseau, M. C., Vedel, I., & Pluye, P. (2018). The Mixed Methods Appraisal Tool (MMAT) version 2018 for information professionals and researchers. *Education for Information*, *34*(4), 285–291. https://doi.org/10.3233/EFI-180221

Hoogenhout, M., & Malcolm-Smith, S. (2014). Theory of mind in autism spectrum disorder: Does DSM classification predict development? *Research in Autism Spectrum Disorders*, *8*(6), 597–607. https://doi.org/10.1016/j.rasd.2014.02.005

Howe, L. D., Tilling, K., & Lawlor, D. A. (2015). Studying the life course health

consequences of childhood adversity: Challenges and opportunities. *Circulation*, *131*(19), 1645–1647. https://doi.org/10.1161/circulationaha.115.016251

Huesmann, L. R., & Kirwil, L. (2007). *Why observing violence increases the risk of violent behavior in the observer*. Cambridge University Press.

Hughes, C., & Leekam, S. (2004). What are the links between theory of mind and social relations? Review, reflections and new directions for studies of typical and atypical development. *Social Development*, *13*(4), 590–619. https://doi.org/10.1111/j.1467-9507.2004.00285.x

Institute for Health Metrics and Evaluation. (2021). *GBD Results Tool*. https://ghdx.healthdata.org/gbd-results-tool

Jaeschke, K., Hanna, F., Ali, S., Chowdhary, N., Dua, T., & Charlson, F. (2021). Global estimates of service coverage for severe mental disorders: Findings from the WHO Mental Health Atlas 2017. *Global Mental Health*, *8*, e27. https://doi.org/10.1017/gmh.2021.19

Jordan, L. P., & Graham, E. (2012). Resilience and well-being among children of migrant parents in South-East Asia. *Child Development*, *83*(5), 1672–1688. https://doi.org/10.1111/j.1467-8624.2012.01810.x

Jørgensen, 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. https://doi.org/10.1515/IJAMH.2008.20.1.23

Kalisch, R., Baker, D. G., Basten, U., Boks, M. P., Bonanno, G. A., Brummelman, E., Chmitorz, A., Fernàndez, G., Fiebach, C. J., Galatzer-Levy, I., Geuze, E., Groppa, S., Helmreich, I., Hendler, T., Hermans, E. J., Jovanovic, T., Kubiak, T., Lieb, K., Lutz, B., … Kleim, B. (2017). The resilience framework as a strategy to combat stress-related disorders. *Nature Human Behaviour*, *1*(11), 784–790. https://doi.org/10.1038/s41562-

017-0200-8

Kaminer, D., Du Plessis, B., Hardy, A., & Benjamin, A. (2013). Exposure to violence across multiple sites among young South African adolescents. *Peace and Conflict: Journal of Peace Psychology*, *19*(2), 112–124. https://doi.org/10.1037/a0032487

Kaminer, D., & Eagle, G. (2010). *Traumatic stress in South Africa*. Wits University Press.

Kaminer, D., Hardy, A., Heath, K., Mosdell, J., & Bawa, U. (2013). Gender patterns in the contribution of different types of violence to posttraumatic stress symptoms among South African urban youth. *Child Abuse & Neglect*, *37*(5), 320–330. https://doi.org/10.1016/j.chiabu.2012.12.011

Kara, B., & Selcuk, B. (2023). The role of socioeconomic adversity and armed conflict in executive function, theory of mind and empathy in children. *Child Psychiatry & Human Development*, *54*(2), 533–545. https://doi.org/10.1007/s10578-021-01270-y

Khumalo, R. (2021). *Subjective poverty in South Africa: Findings from General Household Survey, 2019*. Statistics South Africa. https://www.statssa.gov.za/publications/03-10-25/03-10-252019.pdf

Kim-Cohen, J., Moffitt, T. E., Caspi, A., & Taylor, A. (2004). Genetic and environmental processes in young children's resilience and vulnerability to socioeconomic deprivation. *Child Development*, *75*(3), 651–668. https://doi.org/10.1111/j.1467-8624.2004.00699.x

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. https://doi.org/10.4314/ajpsy.v13i2.54360

Kline, R. B. (2016). *Principles and practice of structural equation modelling*. The Guilford Press.

Kolar, K. (2011). Resilience: Revisiting the concept and its utility for social research. *International Journal of Mental Health and Addiction*, *9*(4), 421–433.

https://doi.org/10.1007/s11469-011-9329-2

Koshy, B., Srinivasan, M., Gopalakrishnan, S., Mohan, V. R., Scharf, R., John, S., Beulah, R., Muliyil, J., & Kang, G. (2022). Early childhood stimulating environment predicts later childhood resilience in an Indian longitudinal birth cohort study. *Children*, *9*(11). https://doi.org/10.3390/children9111721

Kozloff, V., Cowell, J. M., Huppert, E., Gomez-Sicard, N., Lee, K., Mahasneh, R., Malcolm-Smith, S., Selcuk, B., Zhou, X., & Decety, J. (2021). An investigation of children's empathic dispositions and behaviours across seven countries. *Infant and Child Development*, *30*(5), 1–16. https://doi.org/10.1002/icd.2251

Kummabutr, J., Buaboon, N., & Sinsiri, C. (2017). Developing resiliency in children through family-based life skills training intervention: A randomized control trial. *Pacific Rim International Journal of Nursing Research*, *21*(1), 59–74. https://d1wqtxts1xzle7.cloudfront.net/78648894/62989-libre.pdf

Lacey, R. E., & Minnis, H. (2020). Practitioner review: Twenty years of research with adverse childhood experience scores–advantages, disadvantages and applications to practice. *Journal of Child Psychology and Psychiatry*, *61*(2), 116–130. https://doi.org/10.1111/jcpp.13135

Lanier, P., Maguire-Jack, K., Lombardi, B., Frey, J., & Rose, R. A. (2018). Adverse childhood experiences and child health outcomes: Comparing cumulative risk and latent class approaches. *Maternal and Child Health Journal*, *22*, 288–297. https://doi.org/10.1007/s10995-017-2365-1

Lewis, S. J., Arseneault, L., Caspi, A., Fisher, H. L., Matthews, T., Moffitt, T. E., Odgers, C. L., Stahl, D., Teng, J. Y., & Danese, A. (2019). The epidemiology of trauma and post-traumatic stress disorder in a representative cohort of young people in England and Wales. *The Lancet Psychiatry*, *6*(3), 247–256. https://doi.org/10.1016/S2215-

0366(19)30031-8

Lindinger, N. M., Malcolm-Smith, S., Dodge, N. C., Molteno, C. D., Thomas, K. G. F., Meintjes, E. M., Jacobson, J. L., & Jacobson, S. W. (2016). Theory of mind in children with fetal alcohol spectrum disorders. *Alcoholism: Clinical and Experimental Research*, *40*(2), 367–376. https://doi.org/10.1111/acer.12961

Littlewood, D., & Holt, D. (2018). Social entrepreneurship in South Africa: Exploring the influence of environment. *Business & Society*, *57*(3), 525–561. https://doi.org/10.1177/0007650315613293

Lund, C., Brooke-Sumner, C., Baingana, F., Baron, E. C., Breuer, E., Chandra, P., Haushofer, J., Herrman, H., Jordans, M., Kieling, C., Medina-Mora, M. E., Morgan, E., Omigbodun, O., Tol, W., Patel, V., & Saxena, S. (2018). Social determinants of mental disorders and the Sustainable Development Goals: A systematic review of reviews. *The Lancet Psychiatry*, *5*(4), 357–369. https://doi.org/10.1016/S2215-0366(18)30060-9

Luo, D., Petrill, S. A., & Thompson, L. A. (1994). An exploration of genetic g: Hierarchical factor analysis of cognitive data from the Western Reserve Twin Project. *Intelligence*, *18*(3), 335–347. https://doi.org/10.1016/0160-2896(94)90033-7

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. https://doi.org/10.1111/1467-8624.00164

Malcolm-Smith, S., Pileggi, L. A., & Lewis, R. (2024). Measuring dispositional empathy in South African children. *Acta Neuropsychiatrica*. https://doi.org/10.1017/neu.2024.19

Malindi, M. J. (2014). Exploring the Roots of Resilience among Female Street-involved Children in South Africa. *Journal of Psychology*, *5*(1), 35–45. https://doi.org/10.1080/09764224.2014.11885503

Margolin, G., & Gordis, E. B. (2004). Children's exposure to violence in the family and

community. *Current Directions in Psychological Science*, *13*(4), 152–155. https://doi.org/10.1111/j.0963-7214.2004.00296.x

Markon, K. E. (2019). Bifactor and hierarchical models: Specification, inference, and interpretation. *Annual Review of Clinical Psychology*, *15*, 51–69. https://doi.org/10.1146/annurev-clinpsy-050718-095522

Massad, S., Nieto, F. J., Palta, M., Smith, M., Clark, R., & Thabet, A. A. (2009). Mental health of children in Palestinian kindergartens: Resilience and vulnerability. *Child and Adolescent Mental Health*, *14*(2), 89–96. https://doi.org/10.1111/j.1475-3588.2009.00528.x

Masten, A. S. (2011). Resilience in children threatened by extreme adversity: Frameworks for research, practice, and translational synergy. *Development and Psychopathology*, *23*(2), 493–506. https://doi.org/10.1017/S0954579411000198

Masten, A. S. (2014). Global perspectives on resilience in children and youth. *Child Development*, *85*(1), 6–20. https://doi.org/10.1111/cdev.12205

Masten, A. S., & Cicchetti, D. (2010). Developmental cascades. *Development and Psychopathology*, *22*(3), 491–495. https://doi.org/10.1017/S0954579410000222

Masten, A. S., & Cicchetti, D. (2016). Resilience in development: Progress and transformation. *Developmental Psychopathology*, *4*(3), 271–333. https://doi.org/10.1002/9781119125556.devpsy406

Masten, A. S., Lucke, C. M., Nelson, K. M., & Stallworthy, I. C. (2021). Resilience in development and psychopathology: Multisystem perspectives. *Annual Review of Clinical Psychology*, *17*, 521–549. https://doi.org/10.1146/annurev-clinpsy-081219-120307

Masten, A. S., & Narayan, A. J. (2012). Child development in the context of disaster, war, and terrorism: Pathways of risk and resilience. *Annual Review of Psychology*, *63*(1),

227–257. https://doi.org/10.1146/annurev-psych-120710-100356

McCoy, D. C., Peet, E. D., Ezzati, M., Danaei, G., Black, M. M., Sudfeld, C. R., Fawzi, W., & 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), 1–18. https://doi.org/10.1371/journal.pmed.1002034

Mcewen, C. A., & Mcewen, B. S. (2017). Social structure, adversity, toxic stress, and intergenerational poverty: An early childhood model. *Annual Review of Sociology*, *43*, 445–472. https://doi.org/10.1146/annurev-soc-060116-053252

McLaughlin, K. A. (2016). Future directions in childhood adversity and youth psychopathology. *Journal of Clinical Child & Adolescent Psychology*, *45*(3), 361–382. https://doi.org/10.1080/15374416.2015.1110823

McLaughlin, K. A., Sheridan, M. A., & Lambert, H. K. (2014). Childhood adversity and neural development: Deprivation and threat as distinct dimensions of early experience. *Neuroscience and Biobehavioral Reviews*, *47*, 578–591. https://doi.org/10.1016/j.neubiorev.2014.10.012

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*(9), 910–916. https://doi.org/10.1136/jech-2015-205860

Mesman, E., Vreeker, A., & Hillegers, M. (2021). Resilience and mental health in children and adolescents: An update of the recent literature and future directions. *Current Opinion in Psychiatry*, *34*(6), 586–592. https://doi.org/10.1097/YCO.0000000000000741

Mncube, V., & Madikizela-Madiya, N. (2014). Gangsterism as a cause of violence in South African schools: The case of six provinces. *Journal of Sociology and Social*

Anthropology, *5*(1), 43–50. https://doi.org/10.31901/24566764.2014/05.01.06

Mokitimi, S., Schneider, M., & de Vries, P. J. (2022). A situational analysis of child and adolescent mental health services and systems in the Western Cape Province of South Africa. *Child and Adolescent Psychiatry and Mental Health*, *16*(1), 6. https://doi.org/10.21203/rs.3.rs-524889/v1

Montgomery, E. (2010). Trauma and resilience in young refugees: A 9-year follow-up study. *Development and Psychopathology*, *22*(2), 477–489. https://doi.org/10.1017/S0954579410000180

Mosavel, M., Ahmed, R., Ports, K. A., & Simon, C. (2015). South African, urban youth narratives: Resilience within community. *International Journal of Adolescence and Youth*, *20*(2), 245–255. https://doi.org/10.1080/02673843.2013.785439

Mullick, M. S. I., & Goodman, R. (2001). Questionnaire screening for mental health problems in Bangladeshi children: A preliminary study. *Social Psychiatry and Psychiatric Epidemiology*, *36*(2), 94–99. https://doi.org/10.1007/s001270050295

Myer, L., Stein, D. J., Grimsrud, A., Seedat, S., & Williams, D. R. (2008). Social determinants of psychological distress in a nationally-representative sample of South African adults. *Social Science and Medicine*, *66*(8), 1828–1840. https://doi.org/10.1016/j.socscimed.2008.01.025

Myers, H. F., Wyatt, G. E., Ullman, J. B., Loeb, T. B., Chin, D., Prause, N., Zhang, M., Williams, J. K., Slavich, G. M., & Liu, H. (2015). Cumulative burden of lifetime adversities: Trauma and mental health in low-SES African Americans and Latino/as. *Psychological Trauma: Theory, Research, Practice, and Policy*, *7*(3), 243. https://doi.org/10.1037/a0039077

Nelson, C. A., Scott, R. D., Bhutta, Z. A., Harris, N. B., Danese, A., & Samara, M. (2020). Adversity in childhood is linked to mental and physical health throughout life. *The BMJ*,

371, 1–9. https://doi.org/10.1136/bmj.m3048

Norman, R., Matzopoulos, R., Groenewald, P., & Bradshaw, D. (2007). The high burden of injuries in South Africa. *Bulletin of the World Health Organization*, *85*, 695–702. https://doi.org/10.2471/BLT.06.037184

O'Grady, K. A., Rollison, D. G., Hanna, T. S., Schreiber-Pan, H., & Ruiz, M. A. (2012). Earthquake in Haiti: Relationship with the sacred in times of trauma. *Journal of Psychology and Theology.*, *40*(4), 289–301. https://doi.org/10.1177/009164711204000404

Oh, D. L., Jerman, P., Purewal Boparai, S. K., Koita, K., Briner, S., Bucci, M., & Harris, N. B. (2018). Review of tools for measuring exposure to adversity in children and adolescents. *Journal of Pediatric Health Care*, *32*(6), 564–583. https://doi.org/10.1016/j.pedhc.2018.04.021

Olasupo, O., & Hosea, O. P. (2024). Nationalism and post-apartheid struggles in South Africa. *Journal of Nation-Building and Policy Studies*, *8*(2), 99. https://doi.org/10.31920/2516-3132/2024/v8n2a6

Panagou, C., & Macbeth, A. (2024). Trajectories of risk and resilience: The role of empathy and perceived social support in the context of early adversity. *Child Abuse and Neglect*, *153*, 106811. https://doi.org/10.1016/j.chiabu.2024.106811

Patel, V., Chisholm, D., Parikh, R., Charlson, F. J., Degenhardt, L., Dua, T., Ferrari, A. J., Hyman, S., Laxminarayan, R., Levin, C., Lund, C., Medina Mora, M. E., Petersen, I., Scott, J., Shidhaye, R., Vijayakumar, L., Thornicroft, G., & Whiteford, H. (2016). Addressing the burden of mental, neurological, and substance use disorders: Key messages from "Disease Control Priorities", 3rd edition. *The Lancet*, *387*(10028), 1672–1685. https://doi.org/10.1016/S0140-6736(15)00390-6

Patel, V., Saxena, S., Lund, C., Kohrt, B., Kieling, C., Sunkel, C., Kola, L., Chang, O.,

Charlson, F., O'Neill, K., & Herrman, H. (2023). Transforming mental health systems globally: Principles and policy recommendations. *The Lancet*, *402*(10402), 656–666. https://doi.org/10.1016/S0140-6736(23)00918-2

Polizzi, C. P., & Lynn, S. J. (2021). Regulating emotionality to manage adversity: A systematic review of the relation between emotion regulation and psychological resilience. *Cognitive Therapy and Research*, *45*(4), 577–597. https://doi.org/10.1007/s10608-020-10186-1

Posel, D., Hall, K., & Goagoses, L. (2023). Going beyond female-headed households: Household composition and gender differences in poverty. *Development Southern Africa*, *40*(5), 1117–1134. https://doi.org/0.1080/0376835x.2023.2182760

Putnam, S. P., Gartstein, M. A., & Rothbart, M. K. (2006). Measurement of fine-grained aspects of toddler temperament: The Early Childhood Behavior Questionnaire. *Infant Behavior and Development*, *29*(3), 386–401. https://doi.org/10.1016/j.infbeh.2006.01.004

Putnam, S. P., Helbig, A. L., Gartstein, M. A., Rothbart, M. K., & Leerkes, E. (2014). Development and assessment of short and very short forms of the Early Childhood Behavior Questionnaire. *Journal of Personality Assessment*, *96*(4), 445–458. https://doi.org/10.1080/00223891.2013.841171

R Core Team. (2022). *R: A language and environment for statistical computing*. R Foundation for Statistical Computing. https://www.r-project.org/

Rankin, C. H., Abrams, T., Barry, R. J., Bhatnagar, S., Clayton, D. F., Colombo, J., Coppola, G., Geyer, M. A., Glanzman, D. L., & Marsland, S. (2009). Habituation revisited: An updated and revised description of the behavioral characteristics of habituation. *Neurobiology of Learning and Memory*, *92*(2), 135–138. https://doi.org/10.1016/j.nlm.2008.09.012

Reise, S. P., Moore, T. M., & Haviland, M. G. (2010). Bifactor models and rotations: Exploring the extent to which multidimensional data yield univocal scale scores. *Journal of Personality Assessment*, *92*(6), 544–559. https://doi.org/10.1080/00223891.2010.496477

Reniers, R. L. E. P., Corcoran, R., Drake, R., Shryane, N. M., & Völlm, B. A. (2011). The QCAE: A questionnaire of cognitive and affective empathy. *Journal of Personality Assessment*, *93*(1), 84–95. https://doi.org/10.1080/00223891.2010.528484

Ribeiro, W. S., Grande, A. J., Hoffmann, M. S., Ziebold, C., McDaid, D., Fry, A., Peixoto, C., Miranda, C., King, D., & Tomasi, C. D. (2023). A systematic review of evidence-based interventions for child and adolescent mental health problems in low-and middle-income countries. *Comprehensive Psychiatry*, *121*, 152358. https://doi.org/10.1016/j.comppsych.2022.152358

Rojas-Ortiz, E. C., Álvarez-Rodríguez, V. E., León-Suazo, H. G., Baños-Sánchez, A., Trejo-Morales, P., & Bernal-Alcántara, D. A. (2019). Health Education for preschool children in daycare centers. *Gaceta Medica de Mexico*, *155*, S28–S34. https://doi.org/10.24875/GMM.M19000286

Rosseel, Y. (2012). lavaan: An R package for structural equation modeling. *Journal of Statistical Software*, *48*(2), 1–36. https://doi.org/10.18637/jss.v048.i02

Rothbart, M. K. (2007). Temperament, development, and personality. *Current Directions in Psychological Science*, *16*(4), 207–212. https://doi.org/10.1080/15325024.2013.830530

Rotheram-Borus, M. J., Christodoulou, J., Rezvan, P. H., Comulada, W. S., Gordon, S., Skeen, S., Stewart, J., Almirol, E., & Tomlinson, M. (2019). Maternal HIV does not affect resiliency among uninfected/HIV exposed South African children from birth to 5 years of age. *Aids*, *33*, S5–S16. https://doi.org/10.1097/QAD.0000000000002176

Roysircar, G., Thompson, A., & Geisinger, K. F. (2019). Trauma coping of mothers and

children among poor people in Haiti: Mixed methods study of community-level research. *American Psychologist*, *74*(9), 1189–1206. https://doi.org/10.1037/amp0000542

Rutter, M. (2012). Resilience as a dynamic concept. *Development and Psychopathology*, *24*(2), 335–344. https://doi.org/10.1017/S0954579412000028

Rydell, A. M., Berlin, L., & Bohlin, G. (2003). Emotionality, emotion regulation, and adaptation among 5- to 8-year-old children. *Emotion*, *3*(1), 30–47. https://doi.org/10.1037/1528-3542.3.1.30

Rydell, A. M., Thorell, L. B., & Bohlin, G. (2007). Emotion regulation in relation to social functioning: An investigation of child self-reports. *European Journal of Developmental Psychology*, *4*(3), 293–313. https://doi.org/10.1080/17405620600783526

Sahle, B. W., Reavley, N. J., Li, W., Morgan, A. J., Yap, M. B. H., Reupert, A., & Jorm, A. F. (2021). The association between adverse childhood experiences and common mental disorders and suicidality: An umbrella review of systematic reviews and meta-analyses. *European Child & Adolescent Psychiatry*, 1–11. https://doi.org/10.1007/s00787-021-01745-2

Saylor, C. F., Cowart, B. L., Lipovsky, J. A., Jackson, C., & Finch, A. J. (2003). Media exposure to September 11: Elementary school students' experiences and posttraumatic symptoms. *American Behavioral Scientist*, *46*(12), 1622–1642. https://doi.org/10.1177/0002764203254619

Saylor, C. F., Swenson, C. C., Reynolds, S. S., & Taylor, M. (1999). The pediatric emotional distress scale: A brief screening measure for young children exposed to traumatic events. *Journal of Clinical Child and Adolescent Psychology*, *28*(1), 70–81. https://doi.org/10.1207/s15374424jccp2801_6

Schreiber, J. B., Nora, A., Stage, F. K., Barlow, E. A., & King, J. (2006). Reporting modeling

analysis and confirmatory results: Equation factor review. *The Journal of Educational Research*, *99*(6), 323–337. https://doi.org/10.3200/joer.99.6.323-338

Sciaraffa, M. A., Zeanah, P. D., & Zeanah, C. H. (2018). Understanding and promoting resilience in the context of adverse childhood experiences. *Early Childhood Education Journal*, *46*(3), 343–353. https://doi.org/10.1007/s10643-017-0869-3

Sharp, C., Penner, F., Marais, L., & Skinner, D. (2018). School connectedness as psychological resilience factor in children affected by HIV/AIDS. *AIDS Care - Psychological and Socio-Medical Aspects of AIDS/HIV*, *30*, 34–41. https://doi.org/10.1080/09540121.2018.1511045

Shisana, O., Stein, D. J., Zungu, N. P., & Wolvaardt, G. (2024). The rationale for South Africa to prioritise mental health care as a critical aspect of overall health care. *Comprehensive Psychiatry*, *130*, 152458. https://doi.org/https://doi.org/10.1016/j.comppsych.2024.152458

Shonkoff, J. P., Slopen, N., & Williams, D. R. (2020). Early childhood adversity, toxic stress, and the impacts of racism on the foundations of health. *Annual Review of Public Health*, *42*, 115–134. https://doi.org/10.1146/annurev-publhealth-090419-101940

Simelane, S. R. N., Mokitimi, S., Nassen, R., & de Vries, P. J. (2022). Health services and systems for child and adolescent mental disorders in South Africa: Towards a better future. In M. Tomlinson, S. Kleintjes, & L. Lake (Eds.), *South African Child Gauge 2021/2022* (pp. 99–112). Children's Institute, University of Cape Town, South Africa. https://ci.uct.ac.za/sites/default/files/content_migration/health_uct_ac_za/533/files/health%2520services%2520and%2520systems.pdf

Sleijpen, M., June ter Heide, F. J., Mooren, T., Boeije, H. R., & Kleber, R. J. (2013). Bouncing forward of young refugees: A perspective on resilience research directions. *European Journal of Psychotraumatology*, *4*(1). https://doi.org/10.3402/ejpt.v4i0.20124

Slopen, N., Koenen, K. C., & Kubzansky, L. D. (2014). Cumulative adversity in childhood and emergent risk factors for long-term health. *The Journal of Pediatrics*, *164*(3), 631–638. https://doi.org/10.1016/j.jpeds.2013.11.003

Solmi, M., Radua, J., Olivola, M., Croce, E., Soardo, L., Salazar de Pablo, G., Il Shin, J., Kirkbride, J. B., Jones, P., Kim, J. H., Kim, J. Y., Carvalho, A. F., Seeman, M. V., Correll, C. U., & Fusar-Poli, P. (2022). Age at onset of mental disorders worldwide: Large-scale meta-analysis of 192 epidemiological studies. *Molecular Psychiatry*, *27*(1), 281–295. https://doi.org/10.1038/s41380-021-01161-7

Southwick, S. M., Bonanno, G. A., Masten, A. S., Panter-Brick, C., & Yehuda, R. (2014). Resilience definitions, theory, and challenges: Interdisciplinary perspectives. *European Journal of Psychotraumatology*, *5*(1), 25338. https://doi.org/https://doi.org/10.3402/ejpt.v5.25338.

Southwick, S. M., Pietrzak, R. H., Tsai, J., Krystal, J. H., & Charney, D. (2015). Resilience: An update. *PTSD Research Quarterly*, *25*(4), 1–4. https://www.ptsd.va.gov/publications/rq_docs/V25N4.pdf

Spilsbury, J. C., Drotar, D., Burant, C., Flannery, D., Creeden, R., & Friedman, S. (2005). Psychometric properties of the pediatric emotional distress scale in a diverse sample of children exposed to interpersonal violence. *Journal of Clinical Child and Adolescent Psychology*, *34*(4), 758–764. https://doi.org/10.1207/s15374424jccp3404_17

Stein, D. J., Koen, N., Donald, K. A., Adnams, C. M., Koopowitz, S., Lund, C., Marais, A., Myers, B., Roos, A., Sorsdahl, K., Stern, M., Tomlinson, M., van der Westhuizen, C., Vythilingum, B., Myer, L., Barnett, W., Brittain, K., & Zar, H. J. (2015). Investigating the psychosocial determinants of child health in Africa: The Drakenstein Child Health Study. *Journal of Neuroscience Methods*, *252*, 27–35. https://doi.org/10.1016/j.jneumeth.2015.03.016

Taylor, Z. E., Eisenberg, N., Spinrad, T. L., Eggum, N. D., & Sulik, M. J. (2013). The relations of ego-resiliency and emotion socialization to the development of empathy and prosocial behavior across early childhood. *Emotion*, *13*(5), 822–831. https://doi.org/10.1037/a0032894

Teague, S., Youssef, G. J., Macdonald, J. A., Sciberras, E., Shatte, A., Fuller-Tyszkiewicz, M., Greenwood, C., McIntosh, J., Olsson, C. A., & Hutchinson, D. (2018). Retention strategies in longitudinal cohort studies: A systematic review and meta-analysis. *BMC Medical Research Methodology*, *18*(1), 151. https://doi.org/10.1186/s12874-018-0586-7

Theron, L. (2020). Adolescent Versus Adult Explanations of Resilience Enablers. *Youth & Society*, *52*(1), 78–98. https://doi.org/10.1177/0044118X17731032

Theron, L. (2023). Resilience of sub-Saharan children and adolescents: A scoping review. *Transcultural Psychiatry*, *60*(6), 1017–1039. https://doi.org/10.1177/1363461520938916

Theron, L., & Theron, A. M. C. (2010). A critical review of studies of South African youth resilience, 1990-2008. *South African Journal of Science*, *106*(7–8), 1–8. https://doi.org/10.4102/sajs.v106i7/8.252

Theron, L., Theron, A. M., & Malindi, M. J. (2013). Toward an African definition of resilience: A rural South African community's view of resilient Basotho youth. *Journal of Black Psychology*, *39*(1), 63–87. https://doi.org/10.1177/0095798412454675

Tsunga, L., Heron, J., Lake, M. T., Halligan, S. L., Malcolm-Smith, S., Hoffman, N., Zar, H. J., Fraser, A., Stein, D. J., & Donald, K. A. (2024). Exposure to violence and mental health outcomes among pre-schoolers in a South African birth cohort. *Research on Child and Adolescent Psychopathology*, *52*, 1635–1646. https://doi.org/10.1007/s10802-024-01211-y

Tsunga, L., Lake, M., Halligan, S., Malcolm-Smith, S., Hoffman, N., Heron, J., Zar, H.,

Fraser, A., Donald, K., & Stein, D. (2023). Early childhood violence exposure patterns in The Drakenstein Child Health Study (DCHS). *Wellcome Open Research*, *8*, 36. https://doi.org/10.12688/wellcomeopenres.18598.1

Ungar, M. (2004). A constructionst discourse on resilience: Multiple contexts, multiple realities among at-risk children and youth. *Youth and Society*, *35*(3), 341–365. https://doi.org/10.1177/0044118X03257030

Ungar, M. (2011). Community resilience for youth and families: Facilitative physical and social capital in contexts of adversity. *Children and Youth Services Review*, *33*(9), 1742–1748. https://doi.org/10.1016/j.childyouth.2011.04.027

Ungar, M. (2013). Resilience, trauma, context, and culture. *Trauma, Violence, and Abuse*, *14*(3), 255–266. https://doi.org/10.1177/1524838013487805

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 and Allied Disciplines*, *56*(1), 4–17. https://doi.org/10.1111/jcpp.12306

Ungar, M. (2019). Designing resilience research: Using multiple methods to investigate risk exposure, promotive and protective processes, and contextually relevant outcomes for children and youth. *Child Abuse and Neglect*, *96*(March), 104098. https://doi.org/10.1016/j.chiabu.2019.104098

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. https://doi.org/10.1177/1558689811400607

Ungar, M., & Theron, L. (2020). Resilience and mental health: How multisystemic processes contribute to positive outcomes. *The Lancet Psychiatry*, *7*(5), 441–448. https://doi.org/10.1016/S2215-0366(19)30434-1

United for Global Mental Health. (2022). *Financing of mental health: The current status and future prospects*. https://unitedgmh.org/the-global-advocate/financing-mental-health-current-status-and-future-prospects/

van Breda, A. D. (2017). A comparison of youth resilience across seven South African sites. *Child and Family Social Work*, *22*(1), 226–235. https://doi.org/10.1111/cfs.12222

van Breda, A. D., & Theron, L. (2018). A critical review of South African child and youth resilience studies, 2009–2017. *Children and Youth Services Review*, *91*, 237–247. https://doi.org/10.1016/j.childyouth.2018.06.022

van Rensburg, A. C., Theron, L. C., & Ungar, M. (2019). Using the CYRM-28 with South African young people: A factor structure analysis. *Research on Social Work Practice*, *29*(1), 93–102. https://doi.org/10.1177/1049731517710326

Wakeel, F. (2024). Reimagining maternal resilience: Incorporating the socioecological framework, lifecourse theory, and weathering hypothesis. *American Psychologist*, *79*(8), 1025–1035. https://doi.org/10.1037/amp0001293

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

Walker, S. P., Wachs, T. D., Grantham-Mcgregor, S., Black, M. M., Nelson, C. A., Huffman, S. L., Baker-Henningham, H., Chang, S. M., Hamadani, J. D., Lozoff, B., Gardner, J. M. M., Powell, C. A., Rahman, A., & Richter, L. (2011). Inequality in early childhood: Risk and protective factors for early child development. *The Lancet*, *378*(9799), 1325–1338. https://doi.org/10.1016/S0140-6736(11)60555-2

Walsh, F. (2007). Traumatic Loss and Major Disasters: Strengthening Family and Community Resilience. *Family Process*, *46*(2), 207–227. https://doi.org/10.1111/j.1545-5300.2007.00205.x

Wang, L., Qu, G., Tang, X., Wu, W., Zhang, J., & Sun, Y. (2019). Child neglect and its association with social living ability: Does the resilience attenuate the association? *Psychology, Health and Medicine*, *24*(5), 519–529. https://doi.org/10.1080/13548506.2018.1549743

Wang, L., Shi, Z., Zhang, Y., & Zhang, Z. (2010). Psychometric properties of the 10-item Connor–Davidson Resilience Scale in Chinese earthquake victims. *Psychiatry and Clinical Neurosciences*, *64*(5), 499–504. https://doi.org/10.1111/j.1440-1819.2010.02130.x

Ward, C. L., Artz, L., Berg, J., Boonzaier, F., Crawford-Browne, S., Dawes, A., Foster, D., Matzopoulos, R., Nicol, A., & Seekings, J. (2012). Violence, violence prevention, and safety: A research agenda for South Africa. *SAMJ: South African Medical Journal*, *102*(4), 215–218.

Ward, C. L., Artz, L., Leoschut, L., Kassanjee, R., & Burton, P. (2018). Sexual violence against children in South Africa: A nationally representative cross-sectional study of prevalence and correlates. *The Lancet Global Health*, *6*(4), e460–e468.

Werner, C. H., Tang, M., Kruse, J., Kaufman, J. C., & Spörrle, M. (2014). The Chinese version of the revised creativity domain questionnaire (CDQ-R): First evidence for its factorial validity and systematic association with the big five. *Journal of Creative Behavior*, *48*(4), 254–275. https://doi.org/10.1002/jocb.51

Windle, G., Bennett, K. M., & Noyes, J. (2011). A methodology review of resilience measurement scales. *Health and Quality of Life Outcomes*, *9*(1), 2–18. https://doi.org/10.1186/1477-7525-9-8

Worku, B. N., Abessa, T. G., Franssen, E., Vanvuchelen, M., Kolsteren, P., & Granitzer, M. (2018). Development, social-emotional behavior and resilience of orphaned children in a family-oriented setting. *Journal of Child and Family Studies*, *27*(2), 465–474.

https://doi.org/10.1007/s10826-017-0908-0

World Bank. (2024). *World Bank in South Africa: Overview*.

Wright, M. O., & Masten, A. S. (2015). Pathways to resilience in context. In L. Theron, L. Liebenberg, & M. Ungar (Eds.), *Youth resilience and culture* (pp. 3–22). Springer. https://doi.org/10.1007/978-94-017-9415-2_1

Wright, M. O., Masten, A. S., & Narayan, A. J. (2013). Resilience Processes in Development: Four Waves of Research on Positive Adaptation in the Context of Adversity. In S. Goldstein & R. Brooks (Eds.), *Handbook of Resilience in Children* (pp. 15–37). Springer US. https://doi.org/10.1007/978-1-4614-3661-4_2

Yang, N., Qi, Y., Lu, J., Hu, J., & Ren, Y. (2021). Teacher-child relationships, self-concept, resilience, and social withdrawal among Chinese left-behind children: A moderated mediation model. *Children and Youth Services Review*, *129*(July), 106182. https://doi.org/10.1016/j.childyouth.2021.106182

Yates, J., & Mantler, T. (2023). The resilience of caregivers and children in the context of COVID-19: A systematic review. *Journal of Child and Adolescent Trauma*, *16*(4), 819–838. https://doi.org/10.1007/s40653-022-00514-w

Yates, T. M., Tyrell, F. A., & Masten, A. S. (2015). Resilience theory and the practice of positive psychology from individuals to societies. In S. Joseph (Ed.), *Positive psychology in practice: Promoting human flourishing in work, health, education, and everyday life* (2nd ed., pp. 773–788). Wiley. https://doi.org/10.1002/9781118996874.ch44

Yazdanipour, M., Ashori, M., & Abedi, A. (2021). Impact of group theraplay on the social–emotional assets and resilience in children with hearing loss. *International Journal of Play Therapy*, *31*(2), 107–118. https://doi.org/10.1037/pla0000175

Yule, K., Houston, J., & Grych, J. (2019). Resilience in children exposed to violence: A

meta-analysis of protective factors across ecological contexts. *Clinical Child and Family Psychology Review*, *22*(3), 406–431. https://doi.org/10.1007/s10567-019-00293-1

Zar, H. J., Barnett, W., Myer, L., Stein, D. J., & Nicol, M. P. (2015). Investigating the early-life determinants of illness in Africa: The Drakenstein Child Health Study. *Thorax*, *70*(6), 592–594. https://doi.org/10.1136/thoraxjnl-2014-206242

Zar, H. J., Nduru, P., Stadler, J. A. M., Gray, D., Barnett, W., Lesosky, M., Myer, L., & Nicol, M. P. (2020). Early-life respiratory syncytial virus lower respiratory tract infection in a South African birth cohort: epidemiology and effect on lung health. *The Lancet Global Health*, *8*(10), e1316–e1325. https://doi.org/10.1016/S2214-109X(20)30251-5

Zhang, J., Wu, Y., Qu, G., Wang, L., Wu, W., Tang, X., Liu, H., Chen, X., Zhao, T., Xuan, K., & Sun, Y. (2021). The relationship between psychological resilience and emotion regulation among preschool left-behind children in rural China. *Psychology, Health and Medicine*, *26*(5), 595–606. https://doi.org/10.1080/13548506.2020.1849748

Zhu, J., Zhang, Z., Xu, P., Huang, K., & Li, Y. (2023). Unsociability and social adjustment of Chinese preschool migrant children: The moderating role of resilience. *Frontiers in Psychiatry*, *14*, 1–11. https://doi.org/10.3389/fpsyt.2023.1074217

Zolkoski, S. M., & Bullock, L. M. (2012). Resilience in children and youth: A review. *Children and Youth Services Review*, *34*(12), 2295–2303. https://doi.org/10.1016/j.childyouth.2012.08.009

Appendix A – Scoping Review Search Terms

A1.1 First Search (Including "Longitudinal Studies")

Database:	PUBMED
Date of search:	25 February 2022
Articles retrieved:	127
Articles remaining after duplicates removed in Endnote:	127

Search: ((((((("Psychology"[Mesh] and ((protective factors) or (promotive factors) or (buffer))) AND (psychological resilience)) OR (((((((psychological resilience) AND (humans)) OR ("Resilience, Psychological"[Mesh])) OR ("social Resilience")) OR ("psychosocial resilience")) OR ("emotional resilience")))) AND ((((((child OR children)) OR (youth OR youths OR adolescence OR adolescent OR adolescents)) OR ("Child"[Mesh])) OR ("Adolescent"[Mesh])))))) AND ((("Developing Countries"[Mesh]) OR (Deprived Countries OR Deprived Population OR Deprived Populations OR Developing Countries OR Developing Country OR Developing Economies OR Developing Economy OR Developing Nation OR Developing Nations OR Developing Population OR Developing Populations OR Developing World OR LAMI Countries OR LAMI Country OR Less Developed Countries OR Less Developed Country OR Less Developed Economies OR Less Developed Nation OR Less Developed Nations OR Less Developed World OR Lesser Developed Countries OR Lesser Developed Nations OR LMIC OR LMICS OR Low GDP OR Low GNP OR Low Gross Domestic OR Low Gross National OR Low Income OR Lower GDP OR lower gross domestic OR Lower Income OR Middle Income OR Poor Countries OR Poor Country OR Poor Economies OR Poor Economy OR Poor Nation OR Poor Nations OR Poor Population OR Poor Populations OR poor world OR Poorer Countries OR Poorer Economies OR Poorer Economy OR Poorer Nations OR Poorer Population OR Poorer Populations OR Third World OR Transitional Countries OR Transitional Country OR Transitional Economies OR Transitional Economy OR Under Developed Countries OR Under Developed Country OR under developed nations OR Under Developed World OR Under Served Population OR Under Served Populations OR Underdeveloped Countries OR Underdeveloped Country OR underdeveloped economies OR underdeveloped nations OR underdeveloped population OR Underdeveloped World OR Underserved Countries OR Underserved Nations OR Underserved Population OR Underserved Populations))))) AND ((("Longitudinal Studies"[Mesh]) OR ((longitudinal study OR longitudinal studies))))) **Filters:** Humans, from 2000 - 2022

Database:	EBSCOHOST
Date of search:	01 March 2022
Articles retrieved:	124
Articles remaining after duplicates removed in Endnote:	91

Search String:

(psychology or psychological) AND (protective factors or resilience or resiliency or resilient or promotive factors or buffer) AND (social or emotional or psychosocial) AND (child or children or young person or adolescent or teenager or youth or young people) AND (Deprived Countries OR Deprived Population OR Deprived Populations OR Developing Countries OR Developing Country OR Developing Economies OR Developing Economy OR Developing Nation OR Developing Nations OR Developing Population OR Developing Populations OR Developing World OR LAMI Countries OR LAMI Country OR Less Developed Countries OR Less Developed Country OR Less Developed Economies OR Less Developed Nation OR Less Developed Nations OR Less Developed World OR Lesser Developed Countries OR Lesser Developed Nations OR LMIC OR LMICS OR Low GDP OR Low GNP OR Low Gross Domestic OR Low Gross National OR Low Income OR Lower GDP OR lower gross domestic OR Lower Income OR Middle Income OR Poor Countries OR Poor Country OR Poor Economies OR Poor Economy OR Poor Nation OR Poor Nations OR Poor Population OR Poor Populations OR poor world OR Poorer Countries OR Poorer Economies OR Poorer Economy OR Poorer Nations OR Poorer Population OR Poorer Populations OR Third World OR Transitional Countries OR Transitional Country OR Transitional Economies OR Transitional Economy OR Under Developed Countries OR Under Developed Country OR under developed nations OR Under Developed World OR Under Served Population OR Under Served Populations OR Underdeveloped Countries OR Underdeveloped Country OR underdeveloped economies OR underdeveloped nations OR underdeveloped population OR Underdeveloped World OR Underserved Countries OR Underserved Nations OR Underserved Population OR Underserved Populations) AND (longitudinal studies or longitudinal research)

Limiters - Published Date: 20000101-20221231

Database:	Web of Science
Date of search:	02 March 2022
Articles retrieved:	20
Articles remaining after duplicates removed in Endnote:	14

Search String:

TS=((psychology or psychological)) AND TS=((resilience or resiliency or resilient)) AND TS=((child or children or young person or adolescent or teenager or youth or young people)) AND TS=((social or emotional or psychosocial)) AND TS=((Deprived Countries OR Deprived Population OR Deprived Populations OR Developing Countries OR Developing Country OR Developing Economies OR Developing Economy OR Developing Nation OR Developing Nations OR Developing Population OR Developing Populations OR Developing World OR LAMI Countries OR LAMI Country OR Less Developed Countries OR Less Developed Country OR Less Developed Economies OR Less Developed Nation OR Less Developed Nations OR Less Developed World OR Lesser Developed Countries OR Lesser Developed Nations OR LMIC OR LMICS OR Low GDP OR Low GNP OR Low Gross Domestic OR Low Gross National OR Low Income OR Lower GDP OR lower gross domestic OR Lower Income OR Middle Income OR Poor Countries OR Poor Country OR Poor Economies OR Poor Economy OR Poor Nation OR Poor Nations OR Poor Population OR Poor Populations OR poor world OR Poorer Countries OR Poorer Economies OR Poorer Economy OR Poorer Nations OR Poorer Population OR Poorer Populations OR Third World OR Transitional Countries OR Transitional Country OR Transitional Economies OR Transitional Economy OR Under Developed Countries OR Under Developed Country OR under developed nations OR Under Developed World OR Under Served Population OR Under Served Populations OR Underdeveloped Countries OR Underdeveloped Country OR underdeveloped economies OR underdeveloped nations OR underdeveloped population OR Underdeveloped World OR Underserved Countries OR Underserved Nations OR Underserved Population OR Underserved Populations)) AND TS=((longitudinal studies or longitudinal research))

Database:	SCOPUS
Date of search:	02 March 2022
Articles retrieved:	62
Articles remaining after duplicates removed in Endnote:	29

Search String:

((TITLE-ABS-KEY ((psychology OR psychological) AND (resilience))) AND (TITLE-ABS-KEY ((child OR children OR youth OR youths OR adolescence OR adolescent OR adolescents))) AND ((TITLE-ABS-KEY (("Deprived Countries" OR "Deprived Population" OR "Deprived Populations" OR "Developing Countries" OR "Developing Country" OR "Developing Economies" OR "Developing Economy" OR "Developing Nation" OR "Developing Nations" OR "Developing Population"))) OR (TITLE-ABS-KEY (("Developing Populations" OR "Developing World" OR "LAMI Countries" OR "LAMI Country" OR "Less Developed Countries" OR "Less Developed Country" OR "Less Developed Economies" OR "Less Developed Nation" OR "Less Developed Nations" OR "Less Developed World"))) OR (TITLE-ABS-KEY (("Lesser Developed Countries" OR "Lesser Developed Nations" OR lmic OR lmics OR "Low GDP" OR "Low GNP" OR "Low Gross Domestic" OR "Low Gross National" OR "Low Income" OR "Lower income" OR "Lower GDP" OR "Lower Gross Domestic" OR "Middle Income"))) OR (TITLE-ABS-KEY (("Poor Countries" OR "Poor Country" OR "Poor Economies" OR "Poor Economy" OR "Poor Nation" OR "Poor Nations" OR "Poor Population" OR "Poor Populations" OR "poor world" OR "Poorer Countries" OR "Poorer Economies" OR "Poorer Economy" OR "Poorer Nations"))) OR (TITLE-ABS-KEY (("Poorer Population" OR "Poorer Populations" OR "Third World" OR "Transitional Countries" OR "Transitional Country" OR "Transitional Economies" OR "Transitional Economy" OR "Under Developed" OR "Under Served" OR "Underdeveloped Countries"))) OR (TITLE-ABS-KEY (("Underdeveloped Country" OR "underdeveloped economies" OR "underdeveloped nations" OR "underdeveloped population" OR "Underdeveloped World" OR "Underserved Countries" OR "Underserved Nations" OR "Underserved Population" OR "Underserved Populations"))))) AND (TITLE-ABS-KEY ((longitudinal AND study) OR (longitudinal AND studies) OR (longitudinal AND research))) AND (LIMIT-TO (PUBYEAR , 2022) OR LIMIT-TO (PUBYEAR , 2021) OR LIMIT-TO (PUBYEAR , 2020) OR LIMIT-TO (PUBYEAR , 2019) OR LIMIT-TO (PUBYEAR , 2018) OR LIMIT-TO (PUBYEAR , 2017) OR LIMIT-TO (PUBYEAR , 2016) OR LIMIT-TO (PUBYEAR , 2015) OR LIMIT-TO (PUBYEAR , 2014) OR LIMIT-TO (PUBYEAR , 2013) OR LIMIT-TO (PUBYEAR , 2012) OR LIMIT-TO (PUBYEAR , 2011) OR LIMIT-TO (PUBYEAR , 2010) OR LIMIT-TO (PUBYEAR , 2009) OR LIMIT-TO (PUBYEAR , 2008) OR LIMIT-TO (PUBYEAR , 2007) OR LIMIT-TO (PUBYEAR , 2006) OR LIMIT-TO (PUBYEAR , 2005) OR LIMIT-TO (PUBYEAR , 2004) OR LIMIT-TO (PUBYEAR , 2003) OR LIMIT-TO (PUBYEAR , 2002) OR LIMIT-TO (PUBYEAR , 2001) OR LIMIT-TO (PUBYEAR , 2000))

A1.2 Subsequent Search (Excluding "Longitudinal Studies")

Database:	PUBMED
Date of search:	27 March 2022
Articles retrieved:	1062
Articles remaining after duplicates removed in Endnote:	931
Changes made	- deleted LONGITUDINAL

Search: (((((((("Psychology"[Mesh] and ((protective factors) or (promotive factors) or (buffer))) AND (psychological resilience)) OR (((((((psychological resilience) AND (humans)) OR ("Resilience, Psychological"[Mesh])) OR ("social Resilience")) OR ("psychosocial resilience")) OR ("emotional resilience"))))) AND (((((((child OR children)) OR (youth OR youths OR adolescence OR adolescent OR adolescents)) OR ("Child"[Mesh])) OR ("Adolescent"[Mesh]))))))) AND ((((("Developing Countries"[Mesh]) OR (Deprived Countries OR Deprived Population OR Deprived Populations OR Developing Countries OR Developing Country OR Developing Economies OR Developing Economy OR Developing Nation OR Developing Nations OR Developing Population OR Developing Populations OR Developing World OR LAMI Countries OR LAMI Country OR Less Developed Countries OR Less Developed Country OR Less Developed Economies OR Less Developed Nation OR Less Developed Nations OR Less Developed World OR Lesser Developed Countries OR Lesser Developed Nations OR LMIC OR LMICS OR Low GDP OR Low GNP OR Low Gross Domestic OR Low Gross National OR Low Income OR Lower GDP OR lower gross domestic OR Lower Income OR Middle Income OR Poor Countries OR Poor Country OR Poor Economies OR Poor Economy OR Poor Nation OR Poor Nations OR Poor Population OR Poor Populations OR poor world OR Poorer Countries OR Poorer Economies OR Poorer Economy OR Poorer Nations OR Poorer Population OR Poorer Populations OR Third World OR Transitional Countries OR Transitional Country OR Transitional Economies OR Transitional Economy OR Under Developed Countries OR Under Developed Country OR under developed nations OR Under Developed World OR Under Served Population OR Under Served Populations OR Underdeveloped Countries OR Underdeveloped Country OR underdeveloped economies OR underdeveloped nations OR underdeveloped population OR Underdeveloped World OR Underserved Countries OR Underserved Nations OR Underserved Population OR Underserved Populations)))))) **Filters**: Humans, from 2000 - 2022

Database:	EBSCOHOST
Date of search:	13 April 2022
Articles retrieved:	1093
Articles remaining after duplicates removed in Endnote:	718
Changes:	- deleted LONGITUDINAL

Search String:

(psychology or psychological) AND (protective factors or resilience or resiliency or resilient or promotive factors or buffer) AND (social or emotional or psychosocial) AND (child or children or young person or adolescent or teenager or youth or young people) AND ((Deprived Countries OR Deprived Population OR Deprived Populations OR Developing Countries OR Developing Country OR Developing Economies OR Developing Economy OR Developing Nation OR Developing Nations OR Developing Population OR Developing Populations OR Developing World OR LAMI Countries OR LAMI Country OR Less Developed Countries OR Less Developed Country OR Less Developed Economies OR Less Developed Nation OR Less Developed Nations OR Less Developed World OR Lesser Developed Countries OR Lesser Developed Nations OR LMIC OR LMICS OR Low GDP OR Low GNP OR Low Gross Domestic OR Low Gross National OR Low Income OR Lower GDP OR lower gross domestic OR Lower Income OR Middle Income OR Poor Countries OR Poor Country OR Poor Economies OR Poor Economy OR Poor Nation OR Poor Nations OR Poor Population OR Poor Populations OR poor world OR Poorer Countries OR Poorer Economies OR Poorer Economy OR Poorer Nations OR Poorer Population OR Poorer Populations OR Third World OR Transitional Countries OR Transitional Country OR Transitional Economies OR Transitional Economy OR Under Developed Countries OR Under Developed Country OR under developed nations OR Under Developed World OR Under Served Population OR Under Served Populations OR Underdeveloped Countries OR Underdeveloped Country OR underdeveloped economies OR underdeveloped nations OR underdeveloped population OR Underdeveloped World OR Underserved Countries OR Underserved Nations OR Underserved Population OR Underserved Populations) OR (**Afghanistan OR Albania OR Algeria OR "American Samoa" OR Angola OR Armenia OR Azerbaijan OR Bangladesh OR Belarus OR Byelarus OR Belorussia OR Belize OR Benin OR Bhutan OR Bolivia OR Bosnia OR Botswana OR Brazil OR Bulgaria OR Burma OR "Burkina Faso" OR Burundi OR "Cabo Verde" OR "Cape Verde" OR Cambodia OR Cameroon OR "Central African Republic" OR Chad OR China OR Colombia OR Comoros OR Comores OR Comoro OR Congo OR "Costa Rica" OR "Côte d'Ivoire" OR Cuba OR "Democratic People's Republic of Korea" OR Djibouti OR Dominica OR "Dominican Republic" OR Ecuador OR Egypt OR "El Salvador" OR Eritrea OR Ethiopia OR "Equatorial Guinea" OR Fiji OR Gabon OR Gambia OR Gaza OR "Georgia Republic" OR Georgia OR Ghana OR Grenada OR Grenadines OR Guatemala OR Guinea OR "Guinea Bissau" OR Guyana OR Haiti OR Herzegovina OR Hercegovina OR Honduras OR India OR Indonesia OR Iran OR Iraq OR "Ivory Coast" OR Jamaica OR Jordan OR Kazakhstan OR Kenya OR**

Kiribati OR Korea OR Kosovo OR Kyrgyz OR Kirghizia OR Kirghiz OR Kyrgyzstan OR "Lao PDR" OR Laos OR Lebanon OR Lesotho OR Liberia OR Libya OR Macedonia OR Madagascar OR Malawi OR Malay OR Malaya OR Malaysia OR Maldives OR Mali OR "Marshall Islands" OR Mauritania OR Mauritius OR Mexico OR Micronesia OR Moldova OR Mongolia OR Montenegro OR Morocco OR Mozambique OR Myanmar OR Namibia OR Nepal OR Nicaragua OR Niger OR Nigeria OR Pakistan OR Palau OR "Papua New Guinea" OR Paraguay OR Peru OR Philippines OR Principe OR Romania OR Rwanda OR Ruanda OR Samoa OR "Sao Tome" OR Senegal OR Serbia OR "Sierra Leone" OR "Solomon Islands" OR Somalia OR "South Africa" OR "South Sudan" OR "Sri Lanka" OR "St Lucia" OR "St Vincent" OR Sudan OR Surinam OR Suriname OR Swaziland OR Syria OR "Syrian Arab Republic" OR Tajikistan OR Tadzhikistan OR Tajikistan OR Tadzhik OR Tanzania OR Thailand OR Timor OR Togo OR Tonga OR Tunisia OR Turkey OR Turkmen OR Turkmenistan OR Tuvalu OR Uganda OR Ukraine OR Uzbek OR Uzbekistan OR Vanuatu OR Venezuela OR Vietnam OR "West Bank" OR Yemen OR Zambia OR Zimbabwe)

Limiters - Published Date: 20000101-20221231

Database:	Web of Science
Date of search:	13 April 2022
Articles retrieved:	270
Articles remaining after duplicates removed in Endnote:	143
CHANGES	- deleted LONGITUDINAL

Search String:

TS=((psychology or psychological)) AND TS=((resilience or resiliency or resilient)) AND TS=((child or children or young person or adolescent or teenager or youth or young people)) AND TS=((social or emotional or psychosocial)) AND TS=((Deprived Countries OR Deprived Population OR Deprived Populations OR Developing Countries OR Developing Country OR Developing Economies OR Developing Economy OR Developing Nation OR Developing Nations OR Developing Population OR Developing Populations OR Developing World OR LAMI Countries OR LAMI Country OR Less Developed Countries OR Less Developed Country OR Less Developed Economies OR Less Developed Nation OR Less Developed Nations OR Less Developed World OR Lesser Developed Countries OR Lesser Developed Nations OR LMIC OR LMICS OR Low GDP OR Low GNP OR Low Gross Domestic OR Low Gross National OR Low Income OR Lower GDP OR lower gross domestic OR Lower Income OR Middle Income OR Poor Countries OR Poor Country OR Poor Economies OR Poor Economy OR Poor Nation OR Poor Nations OR Poor Population OR Poor Populations OR poor world OR Poorer Countries OR Poorer Economies OR Poorer Economy OR Poorer Nations OR Poorer Population OR Poorer Populations OR Third World OR Transitional Countries OR Transitional Country OR Transitional Economies OR Transitional Economy OR Under Developed Countries OR Under Developed Country OR under developed nations OR Under Developed World OR Under Served Population OR Under Served Populations OR Underdeveloped Countries OR Underdeveloped Country OR underdeveloped economies OR underdeveloped nations OR underdeveloped population OR Underdeveloped World OR Underserved Countries OR Underserved Nations OR Underserved Population OR Underserved Populations))

Database:	SCOPUS
Date of search:	14 April 2022
Articles retrieved:	408
Articles remaining after duplicates removed in Endnote:	117
Changes	- deleted LONGITUDINAL

Search String:

(TITLE-ABS-KEY (psychology OR psychological)) AND (TITLE-ABS-KEY ((protective AND factors) OR resilience OR resiliency OR resilient OR (promotive AND factors) OR buffer)) AND (TITLE-ABS-KEY (social OR emotional OR psychosocial)) AND (TITLE-ABS-KEY (child OR children OR youth OR youths OR adolescence OR adolescent OR adolescents)) AND (TITLE-ABS-KEY ("Deprived Countries" OR "Deprived Population" OR "Deprived Populations" OR "Developing Countries" OR "Developing Country" OR "Developing Economies" OR "Developing Economy" OR "Developing Nation" OR "Developing Nations")) OR (TITLE-ABS-KEY ("Developing Population" OR "Developing Populations" OR "Developing World" OR "LAMI Countries" OR "LAMI Country" OR "Less Developed Countries" OR "Less Developed Country" OR "Less Developed Economies" OR "Less Developed Nation" OR "Less Developed Nations" OR "Less Developed World")) OR (TITLE-ABS-KEY ("Lesser Developed Countries" OR "Lesser Developed Nations" OR lmic OR lmics OR "Low GDP" OR "Low GNP" OR "Low Gross Domestic" OR "Low Gross National" OR "Low Income" OR "Lower income" OR "Lower GDP" OR "Lower Gross Domestic" OR "Middle Income")) OR (TITLE-ABS-KEY ("Poor Countries" OR "Poor Country" OR "Poor Economies" OR "Poor Economy" OR "Poor Nation" OR "Poor Nations" OR "Poor Population" OR "Poor Populations" OR "poor world" OR "Poorer Countries" OR "Poorer Economies" OR "Poorer Economy" OR "Poorer Nations")) OR (TITLE-ABS-KEY ("Poorer Population" OR "Poorer Populations" OR "Third World" OR "Transitional Countries" OR "Transitional Country" OR "Transitional Economies" OR "Transitional Economy" OR "Under Developed" OR "Under Served" OR "Underdeveloped Countries")) OR (TITLE-ABS-KEY ("Underdeveloped Country" OR "underdeveloped economies" OR "underdeveloped nations" OR "underdeveloped population" OR "Underdeveloped World" OR "Underserved Countries" OR "Underserved Nations" OR "Underserved Population" OR "Underserved Populations")) AND (LIMIT-TO (PUBYEAR , 2022) OR LIMIT-TO (PUBYEAR , 2021) OR LIMIT-TO (PUBYEAR , 2020) OR LIMIT-TO (PUBYEAR , 2019) OR LIMIT-TO (PUBYEAR , 2018) OR LIMIT-TO (PUBYEAR , 2017) OR LIMIT-TO (PUBYEAR , 2016) OR LIMIT-TO (PUBYEAR , 2015) OR LIMIT-TO (PUBYEAR , 2014) OR LIMIT-TO (PUBYEAR , 2013) OR LIMIT-TO (PUBYEAR , 2012) OR LIMIT-TO (PUBYEAR , 2011) OR LIMIT-TO (PUBYEAR , 2010) OR LIMIT-TO (PUBYEAR , 2009) OR LIMIT-TO (PUBYEAR , 2008) OR LIMIT-TO (PUBYEAR , 2007) OR LIMIT-TO (PUBYEAR , 2006) OR LIMIT-TO (PUBYEAR , 2005) OR LIMIT-TO (

PUBYEAR , 2004) OR LIMIT-TO (PUBYEAR , 2003) OR LIMIT-TO (PUBYEAR , 2002) OR LIMIT-TO (PUBYEAR , 2001) OR LIMIT-TO (PUBYEAR , 2000))

A1.3 Subsequent Search (Including "Country Names")

Database:	PUBMED
Date of search:	24 February 2023
Articles retrieved:	2353
Articles remaining after duplicates removed in Endnote:	1102
Changes made	-added all country names

Search: (((“psychological resilience” OR “social resilience” OR “psychosocial resilience” OR “emotional resilience”) or ("Resilience, psychological" [Mesh])) AND (((child OR children OR childhood)) OR ("Child, Preschool"[Mesh] OR "Child"[Mesh]))) AND ((("Developing Countries"[Mesh]) OR (Afghanistan OR Albania OR Algeria OR American Samoa OR Angola OR Armenia OR Azerbaijan OR Bangladesh OR Belarus OR Byelarus OR Belorussia OR Belize OR Benin OR Bhutan OR Bolivia OR Bosnia OR Botswana OR Brazil OR Bulgaria OR Burma OR Burkina Faso OR Burundi OR Cabo Verde OR Cape Verde OR Cambodia OR Cameroon OR Central African Republic OR Chad OR China OR Colombia OR Comoros OR Comores OR Comoro OR Congo OR Costa Rica OR Côte d'Ivoire OR Cuba OR Djibouti OR Dominica OR Dominican Republic OR Ecuador OR Egypt OR El Salvador OR Equatorial Guinea OR Eritrea OR Ethiopia OR Fiji OR Gabon OR Gambia OR Gaza OR Georgia OR Georgia Republic OR Ghana OR Grenada OR Grenadines OR Guatemala OR Guinea OR Guinea- Bissau OR Guyana OR Haiti OR Herzegovina OR Hercegovina OR Honduras OR India OR Indonesia OR Iran OR Iraq OR Ivory Coast OR Jamaica OR Jordan OR Kazakhstan OR Kenya OR Kiribati OR Democratic People’s Republic of Korea OR Kosovo OR Kyrgyz OR Kirghizia OR Kirghiz OR Kyrgyzstan OR Lao PDR OR Laos OR Lebanon OR Lesotho OR Liberia OR Libya OR Macedonia OR Madagascar OR Malawi OR Malay OR Malaya OR Malaysia OR Maldives OR Mali OR Marshall Islands OR Mauritania OR Mauritius OR Mexico OR Micronesia OR Moldova OR Mongolia OR Montenegro OR Morocco OR Mozambique OR Myanmar OR Namibia OR Nepal OR Nicaragua OR Niger OR Nigeria OR Pakistan OR Palau OR Papua New Guinea OR Paraguay OR Peru OR Philippines OR Principe OR Romania OR Ruanda OR Rwanda OR Samoa OR Sao Tome OR Senegal OR Serbia OR Sierra Leone OR Solomon Islands OR Somalia OR South Africa OR South Sudan OR Sri Lanka OR St Lucia OR St Vincent OR Sudan OR Surinam OR Suriname OR Swaziland OR Syria OR Syrian Arab Republic OR Tajikistan OR Tadzhikistan OR Tajikistan OR Tadzhik OR Tanzania OR Thailand OR Timor OR Togo OR Tonga OR Tunisia OR Turkey OR Turkmen OR Turkmenistan OR Tuvalu OR Uganda OR Ukraine OR Uzbek OR Uzbekistan OR Vanuatu OR Venezuela OR Vietnam OR West Bank OR Yemen OR Zambia OR Zimbabwe)) OR (Deprived Countries OR Deprived Population OR Deprived Populations OR Developing Countries OR Developing Country OR Developing Economies OR Developing Economy OR Developing Nation OR Developing Nations OR Developing Population OR Developing Populations OR Developing World OR LAMI Countries OR LAMI Country OR Less Developed Countries OR Less Developed Country OR Less Developed Economies OR Less Developed Nation OR Less Developed Nations

OR Less Developed World OR Lesser Developed Countries OR Lesser Developed Nations OR LMIC OR LMICS OR Low GDP OR Low GNP OR Low Gross Domestic OR Low Gross National OR Low Income Countries OR Low Income Country OR Low Income Economies OR Low Income Economy OR Low Income Nations OR Low Income Population OR Low Income Populations OR Lower GDP OR lower gross domestic OR Lower Income Countries OR Lower Income Country OR Lower Income Nations OR Lower Income Population OR Lower Income Populations OR Middle Income Countries OR Middle Income Country OR Middle Income Economies OR Middle Income Nation OR Middle Income Nations OR Middle Income Population OR Middle Income Populations OR Poor Countries OR Poor Country OR Poor Economies OR Poor Economy OR Poor Nation OR Poor Nations OR Poor Population OR Poor Populations OR poor world OR Poorer Countries OR Poorer Economies OR Poorer Economy OR Poorer Nations OR Poorer Population OR Poorer Populations OR Third World OR Transitional Countries OR Transitional Country OR Transitional Economies OR Transitional Economy OR Under Developed Countries OR Under Developed Country OR under developed nations OR Under Developed World OR Under Served Population OR Under Served Populations OR Underdeveloped Countries OR Underdeveloped Country OR underdeveloped economies OR underdeveloped nations OR underdeveloped population OR Underdeveloped World OR Underserved Countries OR Underserved Nations OR Underserved Population OR Underserved Populations)) AND (((human OR humans)) OR ("Humans"[Mesh])) Filters: from 2000 - 2023

Database:	EBSCOHOST
Date of search:	27 February 2023
Articles retrieved:	2003
Articles remaining after duplicates removed in Endnote:	881
Changes:	- Added country names

Search String: ("psychological resilience") AND ("social resilience" OR "psychosocial resilience" OR "emotional resilience") AND (child*) AND ((Deprived Countries OR Deprived Population OR Deprived Populations OR Developing Countries OR Developing Country OR Developing Economies OR Developing Economy OR Developing Nation OR Developing Nations OR Developing Population OR Developing Populations OR Developing World OR LAMI Countries OR LAMI Country OR Less Developed Countries OR Less Developed Country OR Less Developed Economies OR Less Developed Nation OR Less Developed Nations OR Less Developed World OR Lesser Developed Countries OR Lesser Developed Nations OR LMIC OR LMICS OR Low GDP OR Low GNP OR Low Gross Domestic OR Low Gross National OR Low Income OR Lower GDP OR lower gross domestic OR Lower Income OR Middle Income OR Poor Countries OR Poor Country OR Poor Economies OR Poor Economy OR Poor Nation OR Poor Nations OR Poor Population OR Poor Populations OR poor world OR Poorer Countries OR Poorer Economies OR Poorer Economy OR Poorer Nations OR Poorer Population OR Poorer Populations OR Third World OR Transitional Countries OR Transitional Country OR Transitional Economies OR Transitional Economy OR Under Developed Countries OR Under Developed Country OR under developed nations OR Under Developed World OR Under Served Population OR Under Served Populations OR Underdeveloped Countries OR Underdeveloped Country OR underdeveloped economies OR underdeveloped nations OR underdeveloped population OR Underdeveloped World OR Underserved Countries OR Underserved Nations OR Underserved Population OR Underserved Populations) OR (Afghanistan OR Albania OR Algeria OR “American Samoa” OR Angola OR Armenia OR Azerbaijan OR Bangladesh OR Belarus OR Byelarus OR Belorussia OR Belize OR Benin OR Bhutan OR Bolivia OR Bosnia OR Botswana OR Brazil OR Bulgaria OR Burma OR “Burkina Faso” OR Burundi OR “Cabo Verde” OR “Cape Verde” OR Cambodia OR Cameroon OR “Central African Republic” OR Chad OR China OR Colombia OR Comoros OR Comores OR Comoro OR Congo OR “Costa Rica” OR “Côte d'Ivoire” OR Cuba OR “Democratic People’s Republic of Korea” OR Djibouti OR Dominica OR “Dominican Republic” OR Ecuador OR Egypt OR “El Salvador” OR Eritrea OR Ethiopia OR “Equatorial Guinea” OR Fiji OR Gabon OR Gambia OR Gaza OR “Georgia Republic” OR Georgia OR Ghana OR Grenada OR Grenadines OR Guatemala OR Guinea OR “Guinea Bissau” OR Guyana OR Haiti OR Herzegovina OR Hercegovina OR Honduras OR India OR Indonesia OR Iran OR Iraq OR “Ivory Coast” OR Jamaica OR Jordan OR Kazakhstan OR Kenya OR Kiribati OR Korea OR Kosovo OR Kyrgyz OR Kirghizia OR Kirghiz OR Kyrgyzstan OR “Lao PDR” OR Laos OR Lebanon OR Lesotho OR Liberia OR Libya OR Macedonia OR Madagascar OR Malawi OR Malay OR Malaya OR Malaysia OR Maldives OR Mali OR “Marshall Islands” OR Mauritania OR Mauritius

OR Mexico OR Micronesia OR Moldova OR Mongolia OR Montenegro OR Morocco OR Mozambique OR Myanmar OR Namibia OR Nepal OR Nicaragua OR Niger OR Nigeria OR Pakistan OR Palau OR “Papua New Guinea” OR Paraguay OR Peru OR Philippines OR Principe OR Romania OR Rwanda OR Ruanda OR Samoa OR “Sao Tome” OR Senegal OR Serbia OR “Sierra Leone” OR “Solomon Islands” OR Somalia OR “South Africa” OR “South Sudan” OR “Sri Lanka” OR “St Lucia” OR “St Vincent” OR Sudan OR Surinam OR Suriname OR Swaziland OR Syria OR “Syrian Arab Republic” OR Tajikistan OR Tadzhikistan OR Tajikistan OR Tadzhik OR Tanzania OR Thailand OR Timor OR Togo OR Tonga OR Tunisia OR Turkey OR Turkmen OR Turkmenistan OR Tuvalu OR Uganda OR Ukraine OR Uzbek OR Uzbekistan OR Vanuatu OR Venezuela OR Vietnam OR “West Bank” OR Yemen OR Zambia OR Zimbabwe)

Limiters - Published Date: 20000101-20231231

Database:	Web of Science
Date of search:	03 March 2023
Articles retrieved:	111
Articles remaining after duplicates removed in Endnote:	28
CHANGES	- added country names

Search String:

TS=(child*) AND TS=("psychological resilience") AND (TS=(“Deprived Country“ OR “Deprived Countries” OR “Deprived Population” OR “Deprived Populations” OR “Developing Countries” OR “Developing Country” OR “Developing Economies” OR “Developing Economy” OR “Developing Nation” OR “Developing Nations” OR “Developing Population” OR “Developing Populations” OR “Developing World” OR “LAMI Countries” OR “LAMI Country” OR “Less Developed Countries” OR “Less Developed Country” OR “Less Developed Economies” OR “Less Developed Nation” OR “Less Developed Nations” OR “Less Developed World” OR “Lesser Developed Countries” OR “Lesser Developed Nations” OR LMIC OR LMICS OR “Low GDP” OR “Low GNP” OR “Low Gross Domestic” OR “Low Gross National” OR “Low Income Countries” OR “Low Income Country” OR “Low Income Economies” OR “Low Income Economy” OR “Low Income Nations” OR “Low Income Population” OR “Low Income Populations” OR “Lower GDP” OR “Lower Gross Domestic” OR “Lower Income Countries” OR “Lower Income Country” OR “Lower Income Nations” OR “Lower Income Population” OR “Lower Income Populations” OR “Middle Income Countries” OR “Middle Income Country” OR “Middle Income Economies” OR “Middle Income Nation” OR “Middle Income Nations” OR “Middle Income Population” OR “Middle Income Populations” OR “Poor Countries” OR “Poor Country” OR “Poor Economies” OR “Poor Economy” OR “Poor Nation” OR “Poor Nations” OR “Poor Population” OR “Poor Populations” OR “Poor World” OR “Poorer Countries” OR “Poorer Economies” OR “Poorer Economy” OR “Poorer Nations” OR “Poorer Population” OR “Poorer Populations” OR “Third World” OR “Transitional Countries” OR “Transitional Country” OR “Transitional Economies” OR “Transitional Economy” OR “Under Developed Countries” OR “Under Developed Country” OR “Under Developed Nations” OR “Under Developed World” OR “Under Served Population” OR “Under Served Populations” OR “Underdeveloped Countries” OR “Underdeveloped Country” OR “Underdeveloped Economies” OR “Underdeveloped Nations” OR “Underdeveloped Population” OR “Underdeveloped World” OR “Underserved Countries” OR “Underserved Nations” OR “Underserved Population” OR “Underserved Populations”)) OR TS=(Afghanistan OR Albania OR Algeria OR “American Samoa” OR Angola OR Armenia OR Azerbaijan OR Bangladesh OR Belarus OR Byelarus OR Belorussia OR Belize OR Benin OR Bhutan OR Bolivia OR Bosnia OR Botswana OR Brazil OR Bulgaria OR Burma OR “Burkina Faso” OR Burundi OR “Cabo Verde” OR “Cape Verde” OR Cambodia OR Cameroon OR “Central African Republic” OR Chad OR China OR Colombia OR Comoros OR Comores OR Comoro OR Congo OR “Costa Rica” OR “Côte d'Ivoire” OR Cuba OR “Democratic People’s Republic of Korea” OR Djibouti OR Dominica OR “Dominican Republic” OR

Ecuador OR Egypt OR “El Salvador” OR Eritrea OR Ethiopia OR “Equatorial Guinea” OR Fiji OR Gabon OR Gambia OR Gaza OR “Georgia Republic” OR Georgia OR Ghana OR Grenada OR Grenadines OR Guatemala OR Guinea OR “Guinea Bissau” OR Guyana OR Haiti OR Herzegovina OR Hercegovina OR Honduras OR India OR Indonesia OR Iran OR Iraq OR “Ivory Coast” OR Jamaica OR Jordan OR Kazakhstan OR Kenya OR Kiribati OR Korea OR Kosovo OR Kyrgyz OR Kirghizia OR Kirghiz OR Kyrgyzstan OR “Lao PDR” OR Laos OR Lebanon OR Lesotho OR Liberia OR Libya OR Macedonia OR Madagascar OR Malawi OR Malay OR Malaya OR Malaysia OR Maldives OR Mali OR “Marshall Islands” OR Mauritania OR Mauritius OR Mexico OR Micronesia OR Moldova OR Mongolia OR Montenegro OR Morocco OR Mozambique OR Myanmar OR Namibia OR Nepal OR Nicaragua OR Niger OR Nigeria OR Pakistan OR Palau OR “Papua New Guinea” OR Paraguay OR Peru OR Philippines OR Principe OR Romania OR Rwanda OR Ruanda OR Samoa OR “Sao Tome” OR Senegal OR Serbia OR “Sierra Leone” OR “Solomon Islands” OR Somalia OR “South Africa” OR “South Sudan” OR “Sri Lanka” OR “St Lucia” OR “St Vincent” OR Sudan OR Surinam OR Suriname OR Swaziland OR Syria OR “Syrian Arab Republic” OR Tajikistan OR Tadzhikistan OR Tajikistan OR Tadzhik OR Tanzania OR Thailand OR Timor OR Togo OR Tonga OR Tunisia OR Turkey OR Turkmen OR Turkmenistan OR Tuvalu OR Uganda OR Ukraine OR Uzbek OR Uzbekistan OR Vanuatu OR Venezuela OR Vietnam OR “West Bank” OR Yemen OR Zambia OR Zimbabwe)

Database:	SCOPUS
Date of search:	03 March 2023
Articles retrieved:	452
Articles remaining after duplicates removed in Endnote:	
Changes	- added country names

Search String:

(TITLE-ABS-KEY ((("deprived country" OR "deprived countries" OR "deprived population" OR "deprived populations" OR "developing countries" OR "developing country" OR "developing economies" OR "developing economy" OR "developing nation" OR "developing nations" OR "developing population" OR "developing populations" OR "developing world" OR "lami countries" OR "lami country" OR "less developed countries" OR "less developed country" OR "less developed economies" OR "less developed nation" OR "less developed nations" OR "less developed world" OR "lesser developed countries" OR "lesser developed nations" OR lmic OR lmics OR "low gdp" OR "low gnp" OR "low gross domestic" OR "low gross national" OR "low income countries" OR "low income country" OR "low income economies" OR "low income economy" OR "low income nations" OR "low income population" OR "low income populations" OR "lower gdp" OR "lower gross domestic" OR "lower income countries" OR "lower income country" OR "lower income nations" OR "lower income population" OR "lower income populations" OR "middle income countries" OR "middle income country" OR "middle income economies" OR "middle income nation" OR "middle income nations" OR "middle income population" OR "middle income populations" OR "poor countries" OR "poor country" OR "poor economies" OR "poor economy" OR "poor nation" OR "poor nations" OR "poor population" OR "poor populations" OR "poor world" OR "poorer countries" OR "poorer economies" OR "poorer economy" OR "poorer nations" OR "poorer population" OR "poorer populations" OR "third world" OR "transitional countries" OR "transitional country" OR "transitional economies" OR "transitional economy" OR "under developed countries" OR "under developed country" OR "under developed nations" OR "under developed world" OR "under served population" OR "under served populations" OR "underdeveloped countries" OR "underdeveloped country" OR "underdeveloped economies" OR "underdeveloped nations" OR "underdeveloped population" OR "underdeveloped world" OR "underserved countries" OR "underserved nations" OR "underserved population" OR "underserved populations") OR (afghanistan OR albania OR algeria OR "american samoa" OR angola OR armenia OR azerbaijan OR bangladesh OR belarus OR byelarus OR belorussia OR belize OR benin OR bhutan OR bolivia OR bosnia OR botswana OR brazil OR bulgaria OR burma OR "burkina faso" OR burundi OR "cabo verde" OR "cape verde" OR cambodia OR cameroon OR "central african republic" OR chad OR china OR colombia OR comoros OR comores OR comoro OR congo OR "costa rica" OR "côte d'ivoire" OR cuba OR "democratic people's republic of korea" OR djibouti OR dominica OR "dominican republic" OR ecuador OR egypt OR "el salvador" OR eritrea OR ethiopia OR "equatorial guinea" OR fiji OR gabon OR gambia OR gaza OR "georgia republic" OR georgia OR ghana OR grenada OR grenadines OR guatemala OR

guinea OR "guinea bissau" OR guyana OR haiti OR herzegovina OR hercegovina OR honduras OR india OR indonesia OR iran OR iraq OR "ivory coast" OR jamaica OR jordan OR kazakhstan OR kenya OR kiribati OR korea OR kosovo OR kyrgyz OR kirghizia OR kirghiz OR kyrgyzstan OR "lao pdr" OR laos OR lebanon OR lesotho OR liberia OR libya OR macedonia OR madagascar OR malawi OR malay OR malaya OR malaysia OR maldives OR mali OR "marshall islands" OR mauritania OR mauritius OR mexico OR micronesia OR moldova OR mongolia OR montenegro OR morocco OR mozambique OR myanmar OR namibia OR nepal OR nicaragua OR niger OR nigeria OR pakistan OR palau OR "papua new guinea" OR paraguay OR peru OR philippines OR principe OR romania OR rwanda OR ruanda OR samoa OR "sao tome" OR senegal OR serbia OR "sierra leone" OR "solomon islands" OR somalia OR "south africa" OR "south sudan" OR "sri lanka" OR "st lucia" OR "st vincent" OR sudan OR surinam OR suriname OR swaziland OR syria OR "syrian arab republic" OR tajikistan OR tadzhikistan OR tajikistan OR tadzhik OR tanzania OR thailand OR timor OR togo OR tonga OR tunisia OR turkey OR turkmen OR turkmenistan OR tuvalu OR uganda OR ukraine OR uzbek OR uzbekistan OR vanuatu OR venezuela OR vietnam OR "west bank" OR yemen OR zambia OR zimbabwe)))) AND (TITLE-ABS-KEY (child*)) AND (TITLE-ABS-KEY ("psychological resilience"))

Appendix B – Downs and Black Instrument

A2.1 Modified Downs and Black Checklist for the Assessment of the Methodological Quality of Longitudinal, Cross-Sectional, and Cohort Studies

Item	Criteria	Score
Reporting		
1	Is the hypothesis/aim/objective of the study clearly described? *Yes, if both aim/purpose and hypothesis are described.*	Yes = 1 No = 0
2	Are the main outcomes to be measured clearly described in the Introduction or Methods section? *If the main outcomes are first mentioned in the Results section, the question should be answered No.*	Yes = 1 No = 0
3	Are the characteristics of the participants included in the study clearly described? *Are there inclusion and exclusion criteria mentioned? If it's not clear from the inclusion criteria which participants are excluded, rate as a No.*	Yes = 1 No = 0
5	Are the distributions of principal confounders clearly described? *The main confounders for our study are: sex and age. Secondary confounders are: child health, parental death, parental education, household configuration, guardian employment status, income, family processes.* *For scoring 1 point both main confounders need to be described, for scoring 2 points at least one of the secondary confounders needs to be mentioned as well.*	Yes = 2 Partial = 1 No = 0
6	Are the main findings of the study clearly described? *Simple outcome data should be reported.*	Yes = 1 No = 0
7	Does the study provide estimates of the random variability in the data for the main outcomes? *The standard error, standard deviation or confidence intervals should be reported. If the distribution of the data is not described, it must be assumed that the estimates used were appropriate and the question should be answered Yes.*	Yes = 1 No = 0
9	Have the characteristics of participants lost to follow-up been described? *This should be answered Yes where there were no losses to follow-up or where losses to follow-up were so small that findings would be unaffected by their inclusion. This should be answered No where a study does not report the* *number of participants lost to follow-up. This should be answered n/a if there is no follow-up (cross-sectional).*	Yes = 1 No = 0 N/a = -
10	Have actual probability values been reported (e.g. 0.035 rather than <0.05) for the main outcomes except where the probability value is less than 0.001?	Yes = 1 No = 0
External Validity		

11	Were the subjects asked to participate in the study representative of the entire population from which they were recruited? *The study must identify the source population for participants and describe how the participants were selected. Participants would be representative if they comprised the entire source population, an unselected sample of consecutive participants, or a random sample. Random sampling is only feasible where a list of all members of the relevant population exists. Where a study does not report the proportion of the source population from which the participants are derived, the question should be answered as Unable to Determine. The source population in our review is defined as children aged 10 or younger, from a low-and middle-income country.*	Yes = 1 No = 0 UTD = 0
12	Were those subjects who were prepared to participate representative of the entire population from which they were recruited? *The proportion of those asked who agreed should be stated. Validation that the sample was representative would include demonstrating that the distribution of the main confounding factors was the same in the study sample and the source population.*	Yes = 1 No = 0 UTD = 0
Internal Validity - Bias		
16	If any of the results of the study were based on "data dredging", was this made clear? *Any analyses that had not been planned at the outset of the study should be clearly indicated. If no retrospective unplanned analyses were reported, then answer Yes.*	Yes = 1 No = 0 UTD = 0
17	In cohort/longitudinal studies, do the analyses adjust for different lengths of follow-up of participants? *Where follow-up was the same for all study participants the answer should be Yes. If different lengths of follow-up were adjusted for by, for example, survival analysis the answer should be Yes. Studies where differences in follow-up are ignored should be answered No.* *This should be answered n/a if there is no follow-up (cross-sectional).*	Yes = 1 No = 0 UTD = 0
18	Were the statistical tests used to assess the main outcomes appropriate? *The statistical techniques used must be appropriate to the data. For example, nonparametric methods should be used for small sample sizes. Where little statistical analysis has been undertaken but where there is no evidence of bias, the question should be answered Yes. If the distribution of the data (normal or not) is not described, it must be assumed that the estimates used were appropriate and the question should be answered Yes.*	Yes = 1 No = 0 UTD = 0
20	Were the main outcome measures used accurate (valid and reliable)? *For studies where the outcome measures are clearly described, the question should be answered Yes. For studies which refer to other work or that*	Yes = 1 No = 0 UTD = 0

	demonstrates the outcome measures are accurate, the question should be answered as Yes.	
Internal validity - confounding (selection bias)		
21	Were the participants (cohort/RCT studies) recruited from the same population? *For example, participants for all comparison groups should be selected from the same location. The question should be answered Unable to Determine for cohort studies where there is no information concerning the source of participants included in the study.* *This should be answered n/a if there is no comparison groups (cross-sectional).*	Yes = 1 No = 0 UTD = 0 N/a = -
22	Were study subjects (cohort/RCT studies) recruited over the same period of time? *For a study which does not specify the time period over which participants were recruited, the question should be answered as Unable to Determine.* *This should be answered n/a if there is no follow-up (cross-sectional).*	Yes = 1 No = 0 UTD = 0 N/a = -
25	Was there adequate adjustment for confounding in the analyses from which the main findings were drawn? *This question should be answered No if: the distribution of known confounders was not described; or the distribution of known confounders differed between groups but was not taken into account in the analyses. In non-randomized studies if the effect of the main confounders was not investigated or confounding was demonstrated but no adjustment was made in the final analyses the question should be answered as No.*	Yes = 1 No = 0 UTD = 0
26	Were losses of participants to follow-up taken into account? *If the numbers of participants lost to follow-up are not reported, the question should be answered as Unable to Determine. If the proportion lost to follow-up was too small to affect the main findings, the question should be answered yes.* *This should be answered n/a if there is no follow-up (cross-sectional).*	Yes = 1 No = 0 UTD = 0 N/a = -

A2.2 Modified Downs and Black Checklist for the Assessment of the Methodological Quality of Intervention Studies

Item	Criteria	Score
Reporting		
1	Is the hypothesis/aim/objective of the study clearly described? *Yes, if both aim/purpose and hypothesis are described.*	Yes = 1 No = 0
2	Are the main outcomes to be measured clearly described in the Introduction or Methods section? *If the main outcomes are first mentioned in the Results section, the question should be answered No.*	Yes = 1 No = 0
3	Are the characteristics of the participants included in the study clearly described? *Are there inclusion and exclusion criteria mentioned? If it's not clear from the inclusion criteria which participants are excluded, rate as a No.*	Yes = 1 No = 0
4	Are the interventions of interest clearly described? *Treatments and placebo (where relevant) that are to be compared should be clearly described.*	Yes = 1 No = 0
5	Are the distributions of principal confounders clearly described? *The main confounders for our study are: sex and age. Secondary confounders are: child health, parental death, parental education, household configuration, guardian employment status, income, family processes.* *For scoring 1 point both main confounders need to be described, for scoring 2 points at least one of the secondary confounders needs to be mentioned as well.*	Yes = 2 Partial = 1 No = 0
6	Are the main findings of the study clearly described? *Simple outcome data should be reported.*	Yes = 1 No = 0
7	Does the study provide estimates of the random variability in the data for the main outcomes? *The standard error, standard deviation or confidence intervals should be reported. If the distribution of the data is not described, it must be assumed that the estimates used were appropriate and the question should be answered Yes.*	Yes = 1 No = 0
8	Have all important adverse events that may be a consequence of the intervention been reported? *This should be answered yes if the study demonstrates that there was a comprehensive attempt to measure adverse events. (A list of possible adverse events is provided).*	Yes = 1 No = 0
9	Have the characteristics of participants lost to follow-up been described? *This should be answered Yes where there were no losses to follow-up or where losses to follow-up were so small that findings would be unaffected by*	Yes = 1 No = 0

	their inclusion. This should be answered No where a study does not report the number of participants lost to follow-up.	
10	Have actual probability values been reported (e.g. 0.035 rather than <0.05) for the main outcomes except where the probability value is less than 0.001?	Yes = 1 No = 0
External Validity		
11	Were the subjects asked to participate in the study representative of the entire population from which they were recruited? *The study must identify the source population for participants and describe how the participants were selected. Participants would be representative if they comprised the entire source population, an unselected sample of consecutive participants, or a random sample. Random sampling is only feasible where a list of all members of the relevant population exists. Where a study does not report the proportion of the source population from which the participants are derived, the question should be answered as Unable to Determine. The source population in our review is defined as children aged 10 or younger, from a low-and middle-income country.*	Yes = 1 No = 0 UTD = 0
12	Were those subjects who were prepared to participate representative of the entire population from which they were recruited? *The proportion of those asked who agreed should be stated. Validation that the sample was representative would include demonstrating that the distribution of the main confounding factors was the same in the study sample and the source population.*	Yes = 1 No = 0 UTD = 0
13	Were the staff, places, and facilities where the participants were seen, representative of the environment of the majority of participants receive? *For the question to be answered yes the study should demonstrate that the intervention was representative of that in use in the source population. The question should be answered no if, for example, the intervention was undertaken in a specialist centre unrepresentative of the clinics/schools/environments most of the source population would attend.*	Yes = 1 No = 0 UTD = 0
Internal Validity - Bias		
14	Was an attempt made to blind study participants to the intervention they have received? *For studies where the participants would have no way of knowing which intervention they received, this should be answered yes.*	Yes = 1 No = 0 UTD = 0
15	Was an attempt made to blind those measuring the main outcomes of the intervention?	Yes = 1 No = 0 UTD = 0
16	If any of the results of the study were based on "data dredging", was this made clear?	Yes = 1 No = 0 UTD = 0

	Any analyses that had not been planned at the outset of the study should be clearly indicated. If no retrospective unplanned analyses were reported, then answer Yes.	
17	In cohort/longitudinal studies, do the analyses adjust for different lengths of follow-up of participants? *Where follow-up was the same for all study participants the answer should be Yes. If different lengths of follow-up were adjusted for by, for example, survival analysis the answer should be Yes. Studies where differences in follow-up are ignored should be answered No.* *This should be answered n/a if there is no follow-up (cross-sectional).*	Yes = 1 No = 0 UTD = 0
18	Were the statistical tests used to assess the main outcomes appropriate? *The statistical techniques used must be appropriate to the data. For example, nonparametric methods should be used for small sample sizes. Where little statistical analysis has been undertaken but where there is no evidence of bias, the question should be answered Yes. If the distribution of the data (normal or not) is not described, it must be assumed that the estimates used were appropriate and the question should be answered Yes.*	Yes = 1 No = 0 UTD = 0
19	*Was compliance with the intervention/s reliable?* Where there was noncompliance with the allocated intervention or where there was contamination of one group, the question should be answered no. For studies where the effect of any misclassification was likely to bias any association to the null, the question should be answered yes.	Yes = 1 No = 0 UTD = 0
20	Were the main outcome measures used accurate (valid and reliable)? *For studies where the outcome measures are clearly described, the question should be answered Yes. For studies which refer to other work or that demonstrates the outcome measures are accurate, the question should be answered as Yes.*	Yes = 1 No = 0 UTD = 0
Internal validity - confounding (selection bias)		
21	Were the participants (cohort/RCT studies) recruited from the same population? *For example, participants for all comparison groups should be selected from the same location. The question should be answered Unable to Determine for cohort studies where there is no information concerning the source of participants included in the study.*	Yes = 1 No = 0 UTD = 0
22	Were study subjects (cohort/RCT studies) recruited over the same period of time? *For a study which does not specify the time period over which participants were recruited, the question should be answered as Unable to Determine.*	Yes = 1 No = 0 UTD = 0
23	Were study subjects randomized to intervention groups? *Studies which state that subjects were randomized should be answered yes except where method of randomization would not ensure random allocation. For example, alternate allocation would score no because it is predictable.*	Yes = 1 No = 0 UTD = 0

24	Was the randomized intervention assignment concealed from both patients and health care staff until recruitment was complete and irrevocable? *All nonrandomized studies should be answered no. If assignment was concealed from patients but not from staff, it should be answered no.*	Yes = 1 No = 0 UTD = 0
25	Was there adequate adjustment for confounding in the analyses from which the main findings were drawn? *This question should be answered No if: the distribution of known confounders was not described; or the distribution of known confounders differed between groups but was not taken into account in the analyses. In non-randomized studies if the effect of the main confounders was not investigated or confounding was demonstrated but no adjustment was made in the final analyses the question should be answered as No.*	Yes = 1 No = 0 UTD = 0
26	Were losses of participants to follow-up taken into account? *If the numbers of participants lost to follow-up are not reported, the question should be answered as Unable to Determine. If the proportion lost to follow-up was too small to affect the main findings, the question should be answered yes.*	Yes = 1 No = 0 UTD = 0

Appendix C – Mixed Methods Appraisal Tool

A3.1 Mixed Methods Appraisal Tool (MMAT), version 2018

Category of study designs	Methodological quality criteria	Responses			
		Yes	No	Can't tell	Comments
Screening questions (for all types)	S1. Are there clear research questions?				
	S2. Do the collected data allow to address the research questions?				
	Further appraisal may not be feasible or appropriate when the answer is 'No' or 'Can't tell' to one or both screening questions.				
1. Qualitative	1.1. Is the qualitative approach appropriate to answer the research question?				
	1.2. Are the qualitative data collection methods adequate to address the research question?				
	1.3. Are the findings adequately derived from the data?				
	1.4. Is the interpretation of results sufficiently substantiated by data?				
	1.5. Is there coherence between qualitative data sources, collection, analysis and interpretation?				
2. Quantitative randomized controlled trials	2.1. Is randomization appropriately performed?				
	2.2. Are the groups comparable at baseline?				
	2.3. Are there complete outcome data?				
	2.4. Are outcome assessors blinded to the intervention provided?				
	2.5 Did the participants adhere to the assigned intervention?				
3. Quantitative non-randomized	3.1. Are the participants representative of the target population?				
	3.2. Are measurements appropriate regarding both the outcome and intervention (or exposure)?				
	3.3. Are there complete outcome data?				

Category of study designs	Methodological quality criteria	Responses			
		Yes	No	Can't tell	Comments
	3.4. Are the confounders accounted for in the design and analysis?				
	3.5. During the study period, is the intervention administered (or exposure occurred) as intended?				
4. Quantitative descriptive	4.1. Is the sampling strategy relevant to address the research question?				
	4.2. Is the sample representative of the target population?				
	4.3. Are the measurements appropriate?				
	4.4. Is the risk of nonresponse bias low?				
	4.5. Is the statistical analysis appropriate to answer the research question?				
5. Mixed methods	5.1. Is there an adequate rationale for using a mixed methods design to address the research question?				
	5.2. Are the different components of the study effectively integrated to answer the research question?				
	5.3. Are the outputs of the integration of qualitative and quantitative components adequately interpreted?				
	5.4. Are divergences and inconsistencies between quantitative and qualitative results adequately addressed?				
	5.5. Do the different components of the study adhere to the quality criteria of each tradition of the methods involved?				

Appendix D – Exploratory Factor Analysis of the CECV

A4.1 Overview of the Item Loadings for the Exploratory Factor Analysis of the CECV

Full Scale

Items	ML1 (Witnessing Community Violence)	Communality
cecv_1_54mon	**0.40**	1
cecv_2_54mon	**0.46**	1
cecv_3_54mon	0.29	1
cecv_4_54mon	**0.36**	1
cecv_5_54mon	0.05	1
cecv_6_54mon	**0.57**	1
cecv_7_54mon	**0.52**	1
cecv_8_54mon	0.28	1
cecv_9_54mon	0.05	1
cecv_10_54mon	0.07	1
cecv_11_54mon	**0.58**	1
cecv_12_54mon	**0.53**	1
cecv_13_54mon	0.03	1
cecv_14_54mon	0.02	1
cecv_15_54mon	0.15	1
cecv_16_54mon	-0.02	1
cecv_17_54mon	0.11	1
cecv_18_54mon	0.09	1
cecv_19_54mon	0.05	1
cecv_20_54mon	0.12	1
cecv_21_54mon	0.03	1
cecv_22_54mon	/	1
cecv_23_54mon	/	1
cecv_24_54mon	/	1
cecv_25_54mon	0.10	1
cecv_26_54mon	/	1
cecv_27_54mon	0.08	1
cecv_28_54mon	**0.48**	1
cecv_29_54mon	0.17	1
cecv_30_54mon	**0.48**	1
cecv_31_54mon	0.28	1
cecv_32_54mon	0.26	1
cecv_33_54mon	0.21	1
cecv_34_54mon	0.13	1
cecv_35_54mon	**0.34**	1

Note. Extraction Method = maximum likelihood, Rotation Method = Oblimin with Kaiser normalization. Loadings larger than .30 are in bold.

Appendix E – Exploratory Factor Analysis for the PEDS

A5.1 Overview of the Item Loadings for the Exploratory Factor Analysis of the PEDS

Full Scale

Items	ML2 (Fearful)	ML1 (Acting Out)	ML3 (Emotional Response)	Communality
peds_q1_54mon	0.01	0.10	**0.53**	1.08
peds_q2_54mon	-0.02	-0.02	**0.74**	1.00
peds_q3_54mon*	0.17	0.03	0.29	1.64
peds_q4_54mon	0.25	0.07	**0.36**	1.85
peds_q5_54mon	**0.39**	0.11	-0.03	1.18
peds_q6_54mon	**0.69**	-0.06	0.02	1.01
peds_q7_54mon	**0.62**	-0/05	0.00	1.01
peds_q8_54mon	0.24	0.22	**0.33**	**2.66**
peds_q9_54mon	**0.51**	0.18	-0.10	1.33
peds_q10_54mon	0.47	0.04	0.09	1.09
peds_q11_54mon*	-0.08	0.28	0.24	**2.13**
peds_q12_54mon	0.01	**0.73**	0.07	1.02
peds_q13_54mon	-0.02	**0.55**	0.08	1.04
peds_q14_54mon	0.19	**0.31**	0.08	1.81
peds_q15_54mon*	0.18	0.09	-0.03	1.50
peds_q16_54mon	**0.38**	0.18	0.10	1.57
peds_q17_54mon	**0.38**	0.18	0.10	1.57

Notes. Extraction Method = maximum likelihood, Rotation Method = Oblimin with Kaiser normalization. Loadings larger than .30 are in bold.
* are the items with factor loadings <.30 across all proposed factors.

Appendix F – Exploratory Factor Analysis for Merged Data

A6.1 Overview of the Item Loading for the CECV and PEDS Merged Data

Items	ML2 (Witnessing Community Violence)	ML1 (Acting Out)	ML3 (Fearful)	ML4 (Emotional Response)	Communality
cecv_1_54mon	**0.32**	-0.03	0.00	0.24	1.88
cecv_2_54mon	**0.37**	0.08	-0.05	0.14	1.41
cecv_4_54mon	**0.32**	-0.02	0.06	0.03	1.11
cecv_6_54mon	**0.59**	-0.02	-0.04	0.10	1.07
cecv_7_54mon	**0.58**	0.05	0.06	-0.09	1.09
cecv_11_54mon	**0.56**	0.03	-0.11	0.18	1.30
cecv_12_54mon	**0.54**	0.03	0.00	0.05	1.02
cecv_28_54mon	**0.55**	0.04	0.00	-0.13	1.13
cecv_30_54mon	**0.57**	-0.07	0.16	-0.14	1.31
cecv_35_54mon*	0.24	0.09	-0.09	0.22	**2.54**
peds_q1_54mon	0.02	0.15	0.07	**0.45**	1.29
peds_q2_54mon	0.02	0.04	0.05	**0.66**	1.02
peds_q3_54mon*	-0.04	0.06	0.23	0.22	**2.21**
peds_q4_54mon	-0.03	0.08	0.28	**0.36**	2.04
peds_q5_54mon	0.12	0.12	**0.37**	-0.07	1.53
peds_q6_54mon	0.01	-0.04	**0.64**	0.07	1.03
peds_q7_54mon	0.11	-0.05	**0.59**	0.02	1.08
peds_q8_54mon	0.03	0.24	0.25	**0.33**	**2.80**
peds_q9_54mon	-0.04	0.18	**0.50**	-0.08	1.34
peds_q10_54mon	-0.07	0.06	**0.50**	0.09	1.13
peds_q11_54mon*	0.04	0.29	-0.06	0.18	1.72
peds_q12_54mon	-0.01	**0.76**	0.00	0.05	1.01
peds_q13_54mon	-0.01	**0.56**	0.00	0.04	1.01
peds_q14_54mon	0.01	**0.33**	0.18	0.07	1.67
peds_q15_54mon*	-0.04	0.10	0.21	-0.07	1.80
peds_q16_54mon	-0.01	0.18	**0.38**	0.11	1.64
peds_q17_54mon	0.04	**0.74**	0.01	-0.07	1.02

Note. Extraction Method = maximum likelihood, Rotation Method = Oblimin with Kaiser normalization. Loadings larger than .30 are in bold.

*items with factor loadings <.30.

Appendix G – Confirmatory Factor Analysis for Merged Data

A7.1 Overview of the Item Loadings for the Confirmatory Factor Analysis Using the CECV and PEDS Subscales

	Estimate	Std.Error	P(>|z|)	Std.all
Total =~				
peds_q1_54mon	0.412	0.039	0.000	0.470
peds_q2_54mon	0.491	0.097	0.000	0.491
peds_q4_54mon	0.520	0.096	0.000	0.539
peds_q5_54mon	0.180	0.035	0.000	0.344
peds_q6_54mon	0.247	0.032	0.000	0.468
peds_q7_54mon	0.191	0.028	0.000	0.417
peds_q8_54mon	0.519	0.043	0.000	0.671
peds_q9_54mon	0.249	0.037	0.000	0.476
peds_q10_54mon	0.353	0.043	0.000	0.460
peds_q12_54mon	0.564	0.043	0.000	0.671
peds_q13_54mon	0.411	0.039	0.000	0.481
peds_q14_54mon	0.339	0.047	0.000	0.492
peds_q16_54mon	0.326	0.038	0.000	0.536
peds_q17_54mon	0.399	0.042	0.000	0.579
cecv_1_54mon	0.273	0.058	0.000	0.241
cecv_2_54mon	0.247	0.047	0.000	0.237
cecv_4_54mon	0.047	0.022	0.030	0.129
cecv_6_54mon	0.057	0.018	0.001	0.171
cecv_7_54mon	0.037	0.013	0.003	0.166
cecv_11_54mon	0.118	0.031	0.000	0.212
cecv_12_54mon	0.083	0.023	0.000	0.205
cecv_28_54mon	0.015	0.010	0.161	0.069
cecv_30_54mon	0.012	0.008	0.127	0.083
PEDS1 =~				
peds_q1_54mon	0.459	0.483	0.342	0.525
peds_q2_54mon	0.371	0.451	0.411	0.371
peds_q4_54mon	0.097	0.382	0.801	0.100
peds_q8_54mon	0.166	0.084	0.048	0.214
PEDS2 =~				
peds_q5_54mon	0.156	0.045	0.001	0.298
peds_q6_54mon	0.270	0.051	0.000	0.511
peds_q7_54mon	0.201	0.039	0.000	0.438
peds_q9_54mon	0.145	0.051	0.004	0.277
peds_q10_54mon	0.207	0.069	0.003	0.270
peds_q16_54mon	0.104	0.066	0.117	0.171

	Estimate	Std.Error	P(>|z|)	Std.all
PEDS3 =~				
peds_q12_54mon	0.353	0.099	0.000	0.420
peds_q13_54mon	0.285	0.060	0.000	0.334
peds_q14_54mon	0.067	0.094	0.479	0.096
peds_q17_54mon	0.299	0.060	0.000	0.433
CECV =~				
cecv_1_54mon	0.336	0.066	0.000	0.296
cecv_2_54mon	0.364	0.053	0.000	0.350
cecv_4_54mon	0.116	0.036	0.001	0.318
cecv_6_54mon	0.194	0.041	0.000	0.579
cecv_7_54mon	0.128	0.042	0.002	0.576
cecv_11_54mon	0.290	0.045	0.000	0.521
cecv_12_54mon	0.206	0.051	0.000	0.511
cecv_28_54mon	0.112	0.028	0.000	0.527
cecv_30_54mon	0.078	0.034	0.024	0.559

Appendix H – Descriptive Analysis of the CYRM Total Score Using Binary Outcomes

A8.1 The CYRM Total Scores as Binary Outcomes

Table 20

CYRM Total Scores Compared Using Cochran's Q Test for Binary Outcomes

	Cyrm_60_total (N=695, max=52)			**Cyrm_78_total (N=592, max=52)**			**Cyrm_8y_total (N=661, max=52)**			**Complete Cases (N=487)**
	Cut-off	#	%	Cut-off	#	%	Cut-off	#	%	
Median	46	240	34.5	50	396	66.9	50	433	65.5	Q(2) = 90.591, p < .001.
Binary	>51	98	14.1	>51	195	32.9	>51	274	41.5	Q(2) = 75.646, p < .001.
90%	>46	341	49.1	>46	466	78.7	>46	515	77.9	Q(2) = 77.389, p < .001
80%	>41	538	77.4	>41	543	91.7	>41	607	91.8	Q(2) = 40.164, p < .001
Low	<42	157	22.6	<42	49	8.3	<42	54	8.2	Q(2) = 40.164, p < .001

A8.2 CYRM Median Threshold Cut-Off

A Cochran's Q test was conducted to determine whether there were differences in binary outcomes across three time points (see Table 20). The results of the test indicated a statistically significant difference in proportions across the time points, $Q(2) = 90.591$, $p < .001$. Post-hoc pairwise comparisons using McNemar's tests with Bonferroni correction revealed significant differences between:

- Time 1 and Time 2 ($p < .001$),

- Time 1 and Time 3 ($p < .001$),

But not: Time 2 and Time 3 ($p = 1.00$).

Figure 38

Proportion of CYRM Median Outcomes Across Time Points

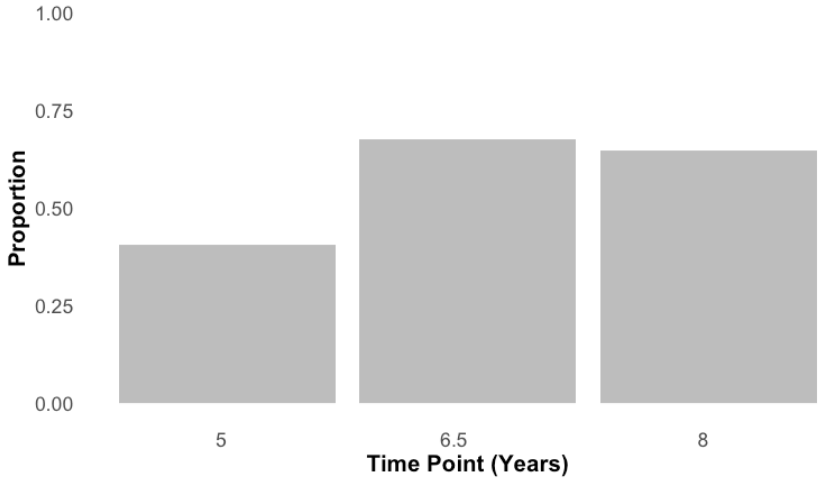


Table 21

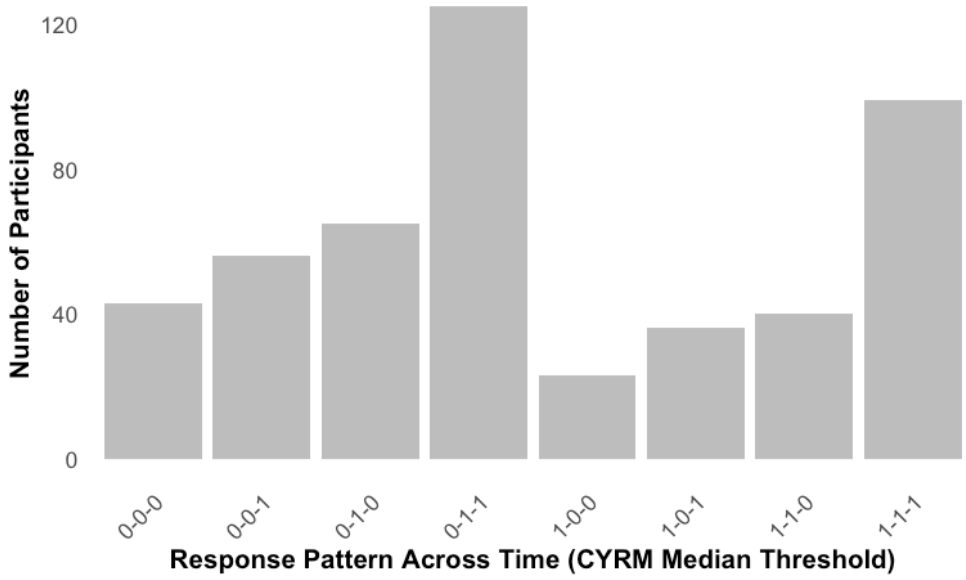
Pattern Analysis for CYRM Median Cut-Off Scores Across Time Points

Pattern	N	Description
0-0-0	43	Stable Low
0-0-1	56	Stable Low to Growth
0-1-0	65	Changing
0-1-1	125	Growth to Stable
1-0-0	23	High to Low
1-0-1	36	Changing
1-1-0	40	Stable High to Low
1-1-1	99	Stable High
	142	Total Stable
	345	Total Changing

Note. 0 = under cut-off

Figure 39

Response Pattern for CYRM Median Threshold Cut-Off Scores over Time



A8.3 CYRM 90% Cut-Off

A Cochran's Q test was conducted to determine whether there were differences in binary outcomes across three time points. The results of the test indicated a statistically significant difference in proportions across the time points, $Q(2) = 77.389$, $p < .001$. Post-hoc pairwise comparisons using McNemar's tests with Bonferroni correction revealed significant differences between:

- Time 1 and Time 2 ($p < .001$),

- Time 1 and Time 3 ($p < .001$),

But not: Time 2 and Time 3 ($p = 1.00$).

Figure 40

Proportion of CYRM 90% Outcomes Across Time Points

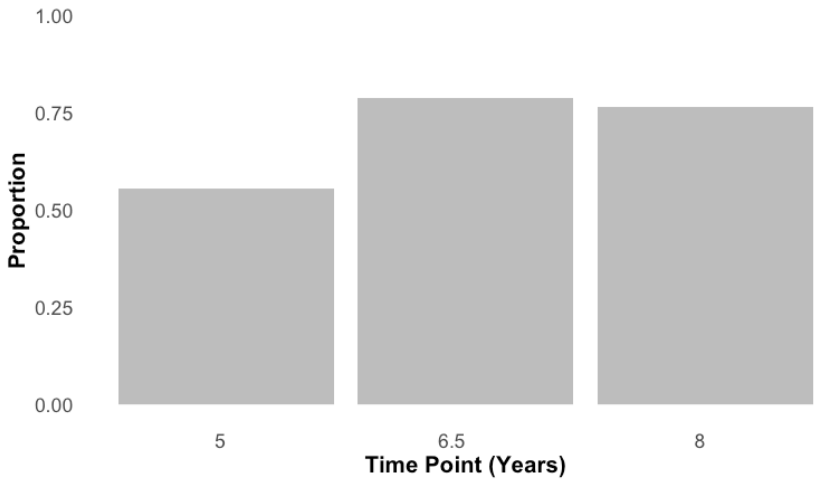


Table 22

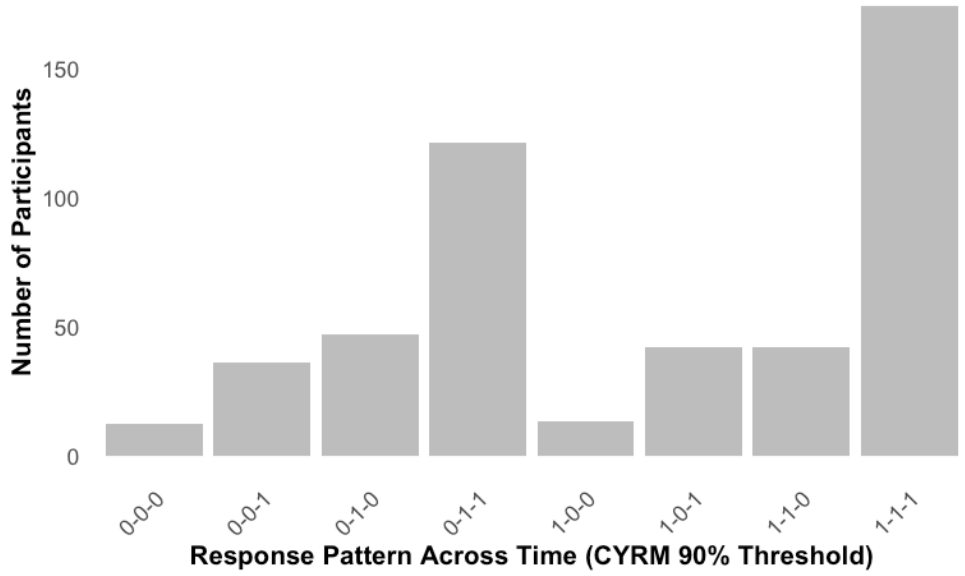
Pattern Analysis for CYRM 90% Cut-Off Scores Across Time Points

Pattern	N	Description
0-0-0	12	Stable Low
0-0-1	36	Stable Low to Growth
0-1-0	47	Changing
0-1-1	121	Growth to Stable
1-0-0	13	High to Low
1-0-1	42	Changing
1-1-0	42	Stable High to Low
1-1-1	174	Stable High
	186	Total Stable
	301	Total Changing

Note. 0 = under cut-off

Figure 41

Response Pattern for CYRM 90% Cut-Off Scores over Time



A8.4 CYRM 80% Cut-Off

A Cochran's Q test was conducted to determine whether there were differences in binary outcomes across three time points. The results of the test indicated a statistically significant difference in proportions across the time points, $Q(2) = 40.164$, $p < .001$. Post-hoc pairwise comparisons using McNemar's tests with Bonferroni correction revealed significant differences between:

- Time 1 and Time 2 ($p < .001$),

- Time 1 and Time 3 ($p < .001$),

But not: Time 2 and Time 3 ($p = 1.00$).

Figure 42

Proportion of CYRM 80% Outcomes Across Time Points

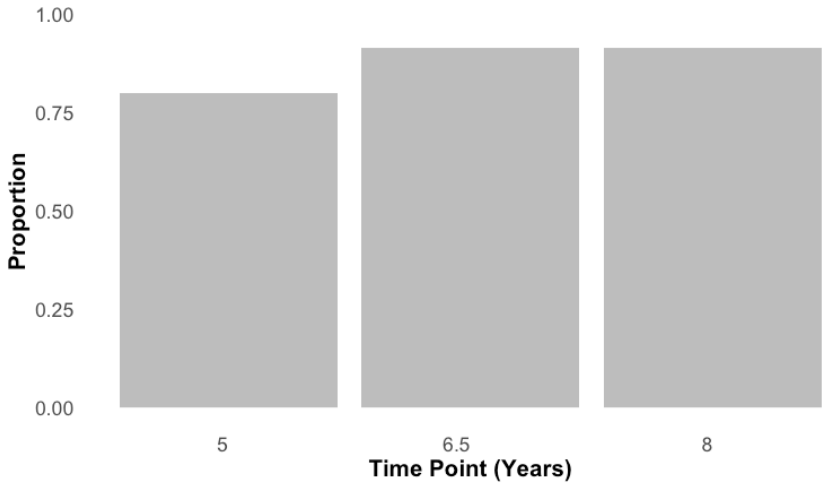


Table 23

Pattern Analysis for CYRM 80% Cut-Off Scores Across Time Points

Pattern	**N**	Description
0-0-0	3	Stable Low
0-0-1	3	Stable Low to Growth
0-1-0	7	Changing
0-1-1	85	Growth to Stable
1-0-0	3	High to Low
1-0-1	33	Changing
1-1-0	28	Stable High to Low
1-1-1	325	Stable High
	328	Total Stable
	159	Total Changing

Note. 0 = under cut-off

Figure 43

Response Pattern for CYRM 80% Cut-Off Scores over Time