A life-course perspective on the biological, psychological and social development of child mental health

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Public interest in child and adolescent development is often driven by societal concerns around citizenship and focused on supporting children to become healthy, productive and moral citizens who are able to contribute meaningfully to society. Yet, the majority of South Africa's children are confronted with high levels of adversity and risk that substantially undermine their ability to achieve happiness, self-fulfilment and mental health.[1] The limits placed on their developmental potential as citizens will play out over their lifetime, with implications for them as individuals, for the next generation of children, and for broader South African society. Understanding the broader developmental context of childhood, and in particular the theories by which mental health may develop or be hindered, helps to contextualise policies and interventions that could facilitate sustainable improvements for all South Africans.

In this chapter we explore how exposures, including positive and negative life events, can impact on normal and necessary developmental processes – which in turn impact on mental health. We explore this from a life-course and developmental perspective, introducing key concepts and processes and unpacking the importance of the timing of exposures and their interaction with normal developmental processes, with a focus on the stress response system, emotional regulation and cognitive control. We illustrate this with a case study that describes how behavioural difficulties or conduct problems can develop and lead to high rates of violence and aggression in educational and social settings; and conclude by outlining important considerations for intervention and policy.

Table 2: Key concepts in life-course perspectives

Term	Broad description
Developmental origins	Health and disease are determined through both hereditary processes (genetics) and environmental exposures starting before conception and extending across the life course (epigenetics). Although we are born with a genetic 'blueprint' of health and disease risk, our genes can be turned on or off in response to environmental exposures.
Biological embedding	Biological embedding is the process by which early life experiences and environmental exposures affect the developing body and brain. Biological systems can be changed by our exposures (for example, maternal nutritional status impacts on their child's linear growth and later disease risk).
Life-course development	Human development involves processes that take place over time in a cumulative way, unfolding sequentially, in specific stages, linked to each other and to chronological age, and should not be treated separately.
Contextual influence	The way in which children's relationships and the contexts in which they live influence their health and development (for example, the positive influence of a nurturing caregiver may help mitigate the harmful effects of poverty).
Human agency	Individuals construct their lives through the choices and actions they take, within social structures that either provide opportunities and/or impose constraints on their human agency.
Historical context	The lives of individuals are embedded in, and shaped by, both historical time and geographical place (north vs south populations) and where they live relative to current events (for example, climate change or war-induced migration or displacement).
Cultural embedding	Social and cultural experiences become embedded in a worldview and the way in which children make sense of the world (including attitudes towards mental health, cultural beliefs about the origin of mental illness).
Linked lives	People's lives can only be lived interdependently and that most development is contextualised within relationships or a culture of relationship (with families, partners, friends, siblings).

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How does a life-course approach enhance our understanding of children's development and mental health?

By definition, a life-course approach explores the long-term effects of physical and social exposures during pregnancy, childhood and adolescence on health and disease risk in later life.[2] It acknowledges that there are sensitive periods of development and describes different pathways by which health and disease develop across the life course, and intergenerationally. Life-course approaches are important because they prompt us to consider how multiple biological, psychological, social, environmental influences contribute to risk or resilience, as well as *when* and *why* things might go wrong.

Most disciplines – including biology, public health, psychiatry, psychology, sociology, anthropology, history and philosophy – subscribe to some kind of life-course approach in thinking about how health and mental health emerges over the lifespan, across generations and through the course of history.

Key concepts

Each discipline tends to adopt a different lens when theorising about the importance of different life-course influences. For example, biology may have a very specific focus on the role of genetics, while sociology might take a broader view with an emphasis on socio-political environments. Over time, a number of key concepts have emerged across a range of disciplines to describe the complex influences on the development of health and disease,[3] as outlined in Table 2.

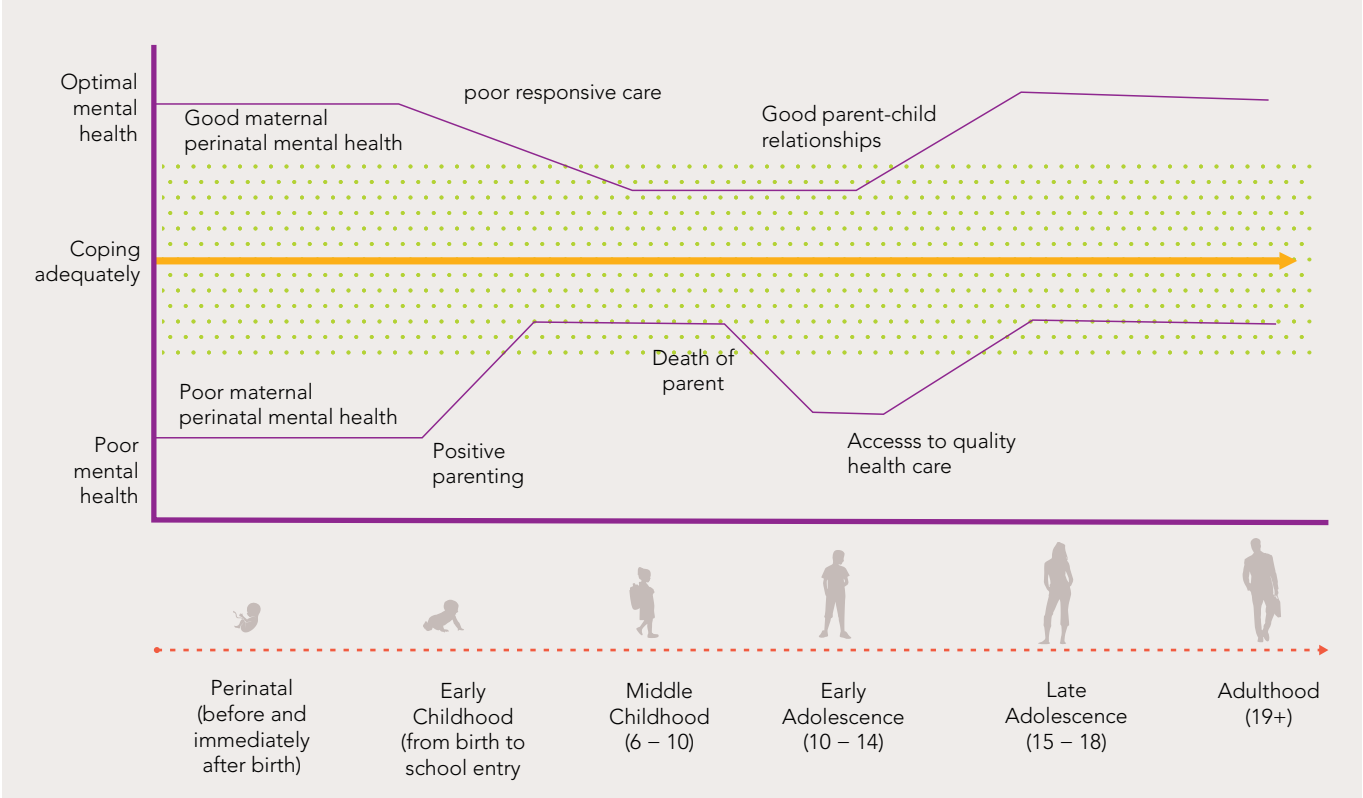
How do life-course effects impact on children's mental health?

Figure 11 provides a simple illustration of how stressors, vulnerabilities and other life-course effects can influence mental health during childhood.

The top line represents someone who is born with a low vulnerability for mental health problems, and whose mother had good perinatal mental health. In early childhood, their environment changes and the care they receive is not adequate to their needs, resulting in a downward turn in their mental health during early and middle childhood, although they still cope adequately. In early adolescence, their parenting environment changes once again, and they experience good parent-child relationships. This sets them back on an upward trajectory towards better mental health in adulthood.

The bottom trajectory represents someone with a high vulnerability to mental health problems – a family history of mental illness and an exposure to their mother's poor mental

Figure 11: Influences on mental health across the life course



health in the womb and during the first few months of their life. In early childhood, their mother receives a mental health intervention and both parents are able to provide a warm, nurturing and responsive environment and this sets their mental health on a positive trajectory. Unfortunately, during middle childhood, the father dies and this leads the mother to develop depression which negatively impacts on the child's mental health. By late adolescence, both mother and child are coping adequately again thanks to quality health care and a targeted intervention to address their bereavement. However, the child still enters adulthood with a mental health vulnerability.

Case 9 presents findings from the South African Birth to Thirty cohort (Bt30) which has contributed enormously to our understanding of development and mental health over the course of childhood in South Africa.

Types of life-course effects

Life-course effects describe how a complex interplay of risk and protective factors affects children's mental health and development over time.

- **Latent effects** occur when a long period of time elapses between an environmental exposure and when its effects become visible. Some exposures may occur in early childhood and remain dormant until triggered by an internal or an external cue later on in life – like how early childhood toxic stress can impact health or non-communicable disease (NCD) outcomes in adulthood.[4]
- **Pathway effects** are the result of experiences or exposures that change a child's developmental trajectory in a positive or a negative way. Unlike the latent effect which may only show itself later in life, pathway effects are immediate adjustments that then determine how things move forward. Even a single experience of trauma or adversity (such as being exposed to war) can significantly alter not only the child's mental health at a point in time, but also their mental health trajectory going forward.[5]
- **Cumulative effects** are things that add up over time. Depending on whether these are positive or negative exposures, they can enhance mental health or lead to mental health problems. Where you end up depends on where you start, but it also depends on what happens (or does not happen) along the way.[6]
- **Bi-directional effects** relate to the influence that children and their environments (family, social, physical, cultural) have on each other across the life course.[7] This allows for an understanding of how parental involvement operates across the life course, how it affects the child's behaviour, and how the child's behaviour in turn can impact on the parent-child relationship and the parent's actions.

How does stress impact children's development and mental health?

Sustained exposure to poverty, inequality and stress, often referred to as toxic stress or developmental trauma, can impact negatively on children's development and their mental health trajectories.[6] The human body deals with stress using what is called the Stress Response System (SRS), which is a biological process by which the body is able to respond to stress or threat using either a flight or fight response (moving away from or toward the threat).[14]

When the body perceives that it is under threat, it steps into action by sending a message from the hypothalamus in the brain to the pituitary gland using the Hypothalamic Pituitary Axis (HPA) to trigger the sympathetic nervous system. This leads to a series of physiological responses (increased heart rate, secretion of adrenalin) and the production of the hormone cortisol in the adrenal system.[15] Cortisol is a stress hormone that stimulates glucose production so that we have the energy we need to respond to a threat. Once the threat is resolved, the parasympathetic nervous systems helps the body get back to normal. While cortisol is needed to help our body survive, too much cortisol can be bad for our health.

When stress is experienced during sensitive and critical developmental periods, or when the stress is ongoing and chronic, it can increase the risk of NCDs such as cardiovascular disease, obesity and poor mental health later in life.[16, 17] Table 3 illustrates how the SRS system develops over childhood and adolescence, and how toxic or chronic stress can influence children's healthy development and mental health during these key developmental stages and later in life.

All children will experience some stress as part of their daily lives and learning to manage stress is an important part of the child's developmental journey. But what we do understand because of life-course science is that how children respond to stress, and how much stress they can cope with, is a delicate balancing act, a bit like a seesaw where protective factors can help balance or limit the impact of stress and adverse events.

For example, children experiencing bullying at school might have feelings of self-doubt, sadness or depression as a result of being bullied. This may lead to withdrawn behaviour and eventually isolation from their friends and teachers who normally support and encourage them. This

Table 3: Evolution of the stress response system and impact of stress across the life course

Developmental period	Prenatal	Childhood	Adolescence
Development of the stress response system	SRS system is very sensitive while developing in the foetus. Prenatal stress can lead to programming effects, which change the way the brain develops and can 'train the brain' to be over-sensitive to stress or lead to the body being less able to recover from stress	Period of stress hyporesponsiveness emerges over infancy and lasts for most of childhood. Child's SRS is less responsive to stress to protect the brain and body from the negative effects of stress hormones on their development. However, chronic stress impacts on physiological development	Puberty triggers changes in the brain, particularly in the frontal lobe which controls risk-taking and sensation-seeking behaviours. During adolescence, onset of puberty and sex hormones make the SRS more sensitive to stress and these effects can differ by gender
Impact of high or chronic stress	Maternal stress, depression and anxiety in pregnancy can lead to: • Lower birthweight • Heightened HPA response at 6 months, 5 and 10 years • Increased attention and behavioural difficulties • Sleep disorders	Chronic stress and adverse childhood events can lead to: • Learning and behavioural difficulties childhood and post-traumatic stress disorder (PTSD) in adulthood • Smaller brain volume and lower self-control in adolescence and adulthood • Childhood stress becomes evident and manifests in abnormal development in adolescence	Adolescent stress can lead to: • Abnormal frontal lobe and HPA functioning and • Stress-related mental disorders like depression, anxiety and increased risk taking • Earlier stress is linked to poor health outcomes like early onset obesity and sleep problems in adolescence

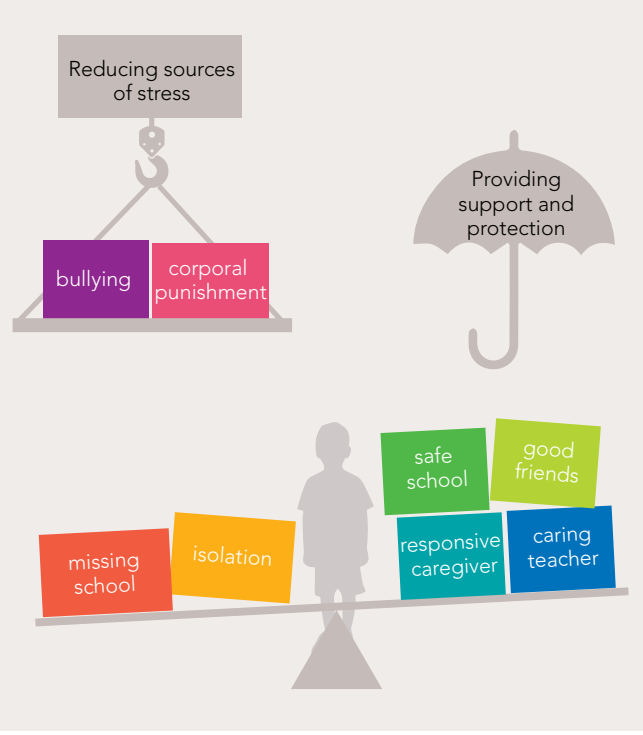
then impacts on their ability to pay attention in school, resulting in academic failure and more feelings of self-doubt and shame. These compounding stressors tip the seesaw and increase their risk of developing a mental health problem like depression.

Once children have a problem, it is hard for them to just 'bounce back'. Instead, we need to find ways to reduce the sources of stress, and/or provide support and protection to help children achieve a healthier balance and recover their mental health, as illustrated in Figure 12.

It is also important to recognise that stressors are experienced differently by different individuals. For example, a negative life event such as a divorce may be experienced as a relief for a child whose was witness to their parents' conflictual or abusive relationship, whereas it can be highly distressing for a child who was unaware of their parents' marital problems.

If we think about mental health in this way, then the differences amongst children's mental health outcomes can be seen as the sum of their individual characteristics – including their hereditary, genetic and biological attributes; their cognitive and psychological capacities; and their exposures and interactions with the world in which they are growing up.

Figure 12: Mental health - a delicate balance between sources of stress and protection



Adapted from: Center on the Developing Child. How to Help Families and Staff Build Resilience During the COVID-19 Outbreak: Harvard University; 2022 [Available from: https://developingchild.harvard.edu/resources/how-to-help-families-and-staff-build-resilience-during-the-covid-19-outbreak/.]

Case 8: Life-course influences on the development of conduct disorder

Conduct disorders are an important mental health priority for four reasons: they are on the rise in South Africa and globally; they predict, with high specificity, adulthood anti-social disorders and violent or criminal behaviours; they predict (non-specifically) a broad range of other psychological disorders (depression, anxiety, substance abuse) in adulthood; and they have substantial immediate and longer-term costs for both children and society.

Conduct problems are highly prevalent in South Africa, occurring in both child and adolescent populations, and are equally common amongst rural and urban populations.[8, 10] While most children and adolescents will experience some behavioural difficulties as a normal part of growing up, behaviours linked to conduct disorders are distinctive in that they result in either violation of the rights of others (aggression, destruction of property, theft) or bring them into significant conflict with societal norms and authority figures. If conduct problems emerge early in childhood, they can start as young as age three, with rates rising substantially by seven to nine years old.[11] Outcomes for children who have conduct problems before age 10 tend to be worse than for those who start to have conduct problems in adolescence.[12]

Conduct disorders can be treated but this is challenging and expensive. For the vast majority of children and adolescents with conduct problems, these will resolve before they reach adulthood, in many cases even without psychological or psychiatric intervention. But because conduct disorder is defined by difficult and socially unacceptable behaviours, children with more severe conduct problems are often highly stigmatised.

Public perceptions of conduct disordered children often blame the child for their behaviour – and their parents for failing to control their child. This can lead to isolation and social exclusion at a time when both the child or adolescent and their parents are extremely vulnerable and need support.

Multiple risks that children with conduct problems need to navigate

Contrary to public perceptions that conduct problems are simply about children behaving badly, conduct disorders offer a good illustration of how a range of biological, social and environmental factors may increase the risk of children developing conduct disorders. This is important because how we look at something and understand it often determines how, if at all, we will respond to it.

The child is navigating the risks within their bodies

Biological risk factors include a complex combination of hereditary (personality traits or temperament, lower prosocial traits) and other genetic factors. Yet, conduct disorder is more likely to be shaped by shared environments (family and parenting relationships) than by genetics alone. Although these are not specific indicators of the disorder, children with conduct disorders have also consistently been shown to have a lower resting heartrate, a biomarker not associated with other mental disorders. Other common associations include reduced autonomic fear conditioning, particularly low skin conductance.

The child is navigating the risks within their brains

Neurobiological and structural differences and deficits in the brain itself and in the connections between the different parts of the brain are also common in conduct disorders. These particularly involve the frontal lobe – or control centre of the brain – which is strongly involved in executive function and impulse control. Deficits in executive functions such as poor attentional control, lower cognitive flexibility, high impulsivity, low frustration tolerance, misreading of emotional cues – specifically seeing neutral cues as aggressive – have been found in children and adolescents with conduct problems.

The child is navigating the risks within their emotions

For the conduct disordered child, there is an important developmental link between emotional dysregulation (outbursts, aggression), their cognitive deficits and their behaviour problems. These deficits lead to obvious problems such as poor impulse or self-control, but also include problems in areas of cognitive flexibility which limit the child's ability to find alternative strategies in heightened or emotive situations. Positive social exposures including role modelling and co-regulation can mitigate these effects. Emotional dysregulation puts the child at high risk of experiencing severe depression or anxiety which, when combined with social isolation, can lead to self-harm and substance abuse.

The child is navigating the risks within their families

Psychosocial risk factors are often present in both parent and child, and within the parenting environment. Familial influences include psychiatric history, stress, harsh parenting and a family history of violence. This can degrade the quality of parenting over generations. While the parent-child relationship is critical to the development of emotional regulation, it is often strained by the child's difficult behaviour.[13] Parents may become frustrated and resort to harsh parenting – which in turn escalates behavioural difficulties in particular amongst families of lower socio-economic status. While stricter parenting in childhood may lower behavioural problems in the immediate term, it also substantially increases the risk of adolescent affective disorders (such as depression) in the longer term.

The child is navigating the risks within their community

Social influences that heighten risk for conduct problems can include ongoing adversity across the life course (e.g., poverty or lack of access to support services) and 'snares' in childhood and adolescence (e.g., aggression, school expulsion or substance use) which may trap the child or adolescent into persistent problems. As a result of social isolation, the child's exposure to positive influences become more limited. Frustrated educators will often brush children aside as hopeless cases. This heightened negative attention on the child can lead to escalating punishment and truancy or may lead to harsher outcomes like suspension or expulsions, further isolating children from positive peer networks. Adolescents in particular then become vulnerable to being drawn into further delinquent behaviours through negative peer networks such as neighbourhood gangs who encourage and endorse negative behaviours. Children may also be mislabelled as having conduct disorders where children are growing up in environments where disruptive or aggressive behaviours are considered the norm – for example, when living in highly threatening, violent and criminal communities. This is an important consideration given the epidemic of bullying and violence in home, school and community settings in South Africa.

Implications for interventions for conduct disorders

Parenting and behavioural interventions are the more common response to conduct problems; however, in communities where prevalence is high, school and community-wide interventions should be considered. Parenting and behavioural programmes can be stigmatising and uptake and participation by children and adolescents is often poor. Executive functions and emotional regulation have important intervention potential. This is because interventions (such as cognitive training, non-computerised games, aerobics, martial arts and yoga, and school-based interventions including mindfulness) are relatively cost-effective and feasible to scale up, and have benefits for the broader population of children who are not affected by conduct problems. While interventions focused on executive functions should not replace behavioural interventions in severe cases, they may certainly augment them, and may reduce the stigma associated with the latter.[23-26]

Why is it important for children to learn how to control their thoughts and emotions?

Most common mental health problems involve some difficulty with emotions, self-regulation and cognition. There is a bi-directional effect as our cognitive capacities (or the way we think, process information and problem solve) interact with our emotional capacities (or the extent to which we can or cannot control our emotions and feelings). Together these two capacities (commonly referred to emotional regulation and cognitive or self-control) help drive our behaviour (the things we do).

Depression, for example, involves the emotional experience of sadness, loss of interest or feelings of shame or guilt; being unable to control or regulate one's emotions (uncontrolled crying or angry outbursts); and difficulties in thinking (including problems concentrating or experiencing repetitive intrusive thoughts). Children and adolescents who have higher capacities for emotional regulation and cognitive control are often more resilient to mental health difficulties, like depression. For this reason, the healthy development of emotional regulation and cognitive control are central to achieving mental health and regulating our behaviour.

These central capacities are emergent, meaning that they change and develop throughout childhood in response to social exposure and physiological and neurological developments, as we become increasingly sophisticated in our psychological capacity for self-control (both emotional and cognitive control). Children need to learn and develop

these skills over the course of childhood through physical development, relationships, stimulation and healthy socio-emotional experiences. While the development of emotional regulation and cognitive control is dependent on a child's individual characteristics, they are also heavily influenced by the quality of parenting, familial and social exposures. When disrupted or not fully developed, deficits in emotional regulation and cognitive control can lead to children being less able to navigate complex and threatening environments, making them more vulnerable to mental health difficulties

How do disruptions in core capacities undermine mental health?

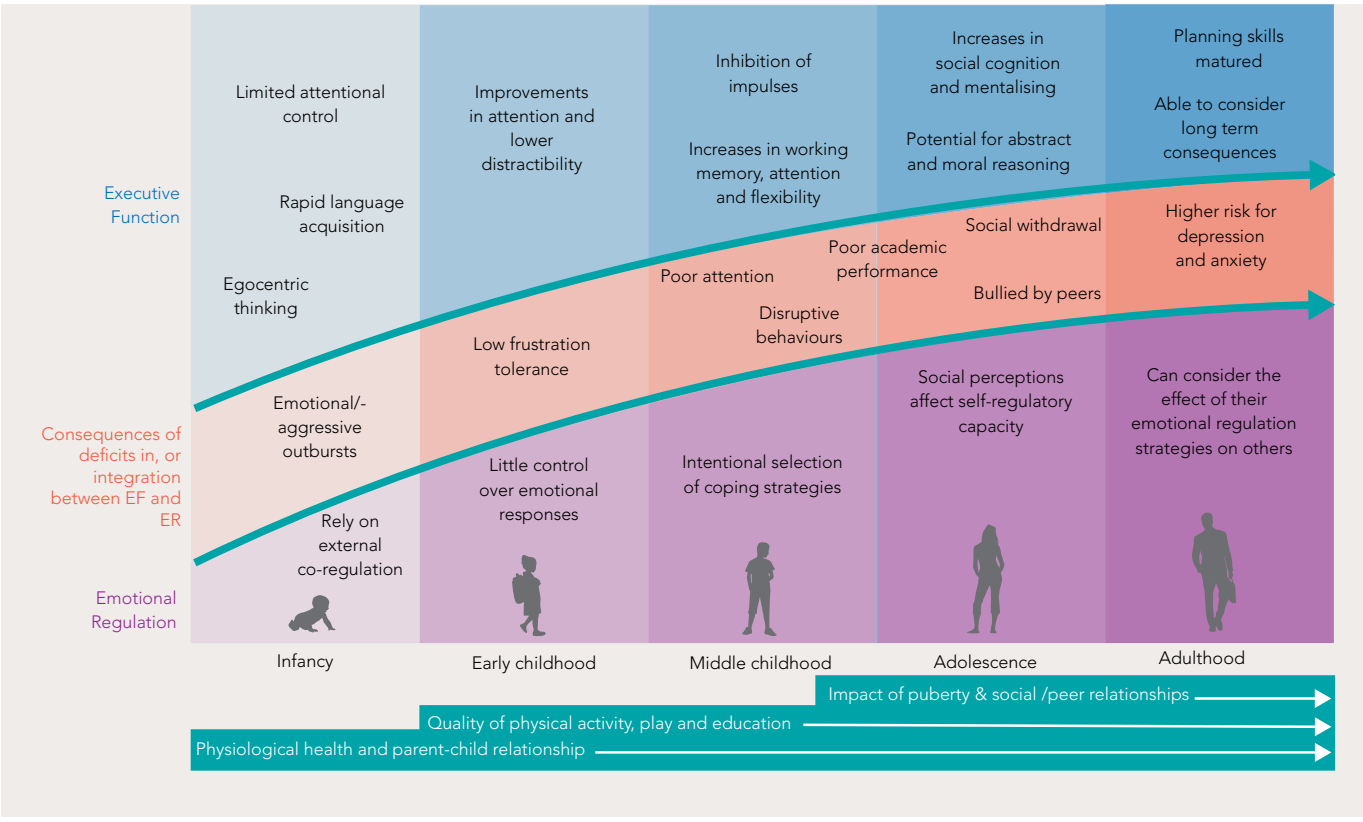
As the child moves from one developmental stage to another biological, cognitive, psychological and social systems become more regulated, integrated and in tune with one another other, to drive healthy human behaviour.[18-20] Mental health problems can emerge when normal development is disrupted by biological changes or triggers[21] like genetic vulnerabilities or illnesses, or by negative socio-emotional experiences, or environmental traumas.[22] These vulnerabilities can also change children's behaviours, and these new behaviours can make children more resilient or put them at risk. And the child's behaviours and actions then influence the responses of those around them.

This process of development is illustrated in Figure 13, alongside potential consequences when normal development becomes disrupted. This does not mean that the child's development is locked into a negative path because most – if not all such – vulnerabilities can be mitigated by positive relationships or positive environmental exposures.

When we think about emotional regulation and cognitive function as important features of mental health, we begin to understand that deficits in these areas may operate in different ways. Firstly, they may predispose children and adolescents to mental health problems (for example, aggression and behaviour problems). Secondly, they may be affected by the mental health problem itself (for example, depression can lead to repetitive negative intrusive thoughts). Lastly, they may maintain the mental health problem or extend its course (for example, your mood may improve but your way of thinking remains negative which then affects your mood, which may make you more vulnerable to relapses).

Case 8 on the previous page illustrates how it is important to understand the complex interplay of a range of biological, social and environmental factors increase the risk of children developing conduct disorders which are highly prevalent amongst children in South Africa.

Figure 13: The interconnectedness of emotional regulation and executive function



How can we protect children from threats to their mental health?

Importantly, life-course effects do not mean that a child's trajectories are predetermined or that the outcome is necessarily going to be negative if they experience a high stress load. This is because we also understand that most, if not all, vulnerabilities can be mitigated by positive relationships or environmental exposures. It does, however, mean that children who are born of parents with a heavy load of lifetime risk exposures are likely to be more vulnerable to future negative risk exposures than children who are not. It is therefore important to understand how the negative effects of environmental factors (which are shared and often difficult to change) can be mitigated by potentially protective factors. Protective factors which are modifiable become productive pathways for targeted interventions in adverse settings.[9]

Life-course research and evidence suggests that family is an important ingredient in limiting the impact of high stress load on children's mental health. Functional family environments play a critical role in mitigating the effects of genetic vulnerabilities, stressful live events and adverse environments. Several gene-environment studies, for example, have shown that genetic variations can lead to increased risk of behavioural problems, but only when combined with exposure to a dysfunctional family environment. Likewise, there is evidence to suggest that the most 'toxic' effects of stress on children occur when that stressor is experienced within the absence of a stable and supportive familial or caregiving environment. Similarly, family level interventions for children and adolescents 'at risk' of mental health problems have shown consistent benefits. These can include improving parental mental health, increasing capacity for parental supervision and monitoring, or increasing parental sensitivity to child and adolescent mental health needs. Family-wide interventions for alcohol and substance use, for example, tend to have better outcomes than individual treatment programmes.

The burden of protecting children's mental health should not, however, rest with families alone. Many adversities such chronic exposure to violence and crime, poverty and inadequate health care are the responsibility of society and are critical to change because of the pervasive negative effect they have on mental health. This is important because exposure to childhood adversities is one of the strongest predictors of poor mental health outcomes for children, regardless of where they start in life or what their socioeconomic status is. A worldwide survey by the World Health Organization (WHO) in 2010 (including over 50,000 participants from 21 countries) suggested that elimination of childhood adversities – especially those associated with maladaptive family functioning (parental mental illness, child abuse, neglect) – could lead to a 30% reduction of mental disorders across the lifetime.

What are the implications for policy and practice?

The key contribution of life-course approaches are that they promote an understanding of the importance of early care, universal and selective prevention, and health promotion.[27] This is because we understand that targeting children and their families with universal services that can help mitigate or protect them from the adversities they might face can help prevent problems both at the time the stressor is present, and also later in their lives. If we wait until a child or adolescent reaches the extreme end of the continuum (a mental disorder) before offering access to mental health support or services, the services needed will likely be more intensive, specialised and expensive, while having a lesser chance of success than if we prevented the problem in the first place.

The acknowledgement of how critical the early years of life are, not only for lifelong health but also the realisation of sustainable societies, has started to permeate policy and programme design globally. A key framework in directing efforts for improving child survival and optimal development is the Nurturing Care Framework (NCF), which was launched in 2018 at the World Health Assembly. Nurturing care is multi-faceted, comprising five components - good health, adequate nutrition, protection from threat, opportunities for learning and responsive caregiving – which are needed to ensure children not only survive, but thrive.[28] No one component is sufficient on its own, and all are interdependent. Although the NCF focuses on the early years (0 – 3 years), emphasising how crucial they are as the foundation for lifelong health, it has been proposed that the framework be extended from preconception through to early adulthood.[29]

It is critical that the lessons inherent in a life-course approach begin to permeate service delivery and practice, and in particular that these service provisions are child and adolescent sensitive.[30] This includes implementing universal or selective prevention, promotion and or early intervention programmes to ensure we eliminate or minimise the effects of adversity on child and adolescent mental health. The focus and locus of these preventative and intervention efforts shifts from one developmental stage to the other, therefore child and adolescent mental health service plans should be sensitive to developmental pathways, as illustrated by some examples of both universal care and selective prevention or early intervention in Table 4.

Table 4: A developmentally sensitive approach to prevention, promotion and early intervention

Stage	Pregnancy	Early childhood	Middle childhood	Early adolescence	Late adolescence
Key Risks	Inadequate health and nutrition and high stress and adversity exposures can lead to immediate (low birth weight, poor growth) and longer term (mental health and NCD) negative outcomes for children	Inadequate health, nutrition, stress and poor quality of parental care can lead to stunting, restricted brain growth, limited cognitive capacity, genetic vulnerability and the impact of stress on the SRS can be intensified in the context of dysfunctional familial environments. Early signs and symptoms of behavioural disorders can be present.	Capacities for emotional regulation and cognitive control can be severely disrupted by adverse childhood events and negative social exposures, high vulnerability to ACEs both in the home, community, school environment and online. First rise in mental illnesses.	Poor education and social exposures can limit the development of self-control, problem solving and increase risk of violence (perpetration and victimisation). Pubertal changes trigger increased risk taking and unhealthy behaviours (alcohol use, smoking, sedentary behaviours) and emergence of body image concerns (with disordered eating).	High risk of school dropout or incompletion, early pregnancy, injuries. Increased risk for non-communicable and infectious diseases, (including HIV). Peak of onset of mental disorders, suicidal ideation and behaviours.
Universal services and support	Access to high quality health services Social support systems to limit food insecurity, provide sources of regular income and secure housing Nutritional and iron supplementation and access to safe delivery	Support for good infant feeding practices, regulatory controls of commercial food industry, maternity leave benefits, workplace policies to promote breastfeeding. Access to home visiting to support responsive caregiving and access to local ECD services and preschools. Environmental programs to ensure safe households, neighbourhoods and to limit children's exposure to toxins.	Strong social welfare system to limit children's exposure to physical and sexual abuse in the home. Safety in schools and monitoring of internet usage, prevention of bullying. Good quality schooling, feeding programmes and regulation of the sugar industry. Community wide initiatives to prevent child abuse and exploitation	Access to high quality health and mental health preventative services (including suicide prevention) through adolescent friendly school services. Psycho-educational services to support positive parenting in adolescence. Social interventions for 'at risk' adolescents, in particular in juvenile justice settings. Strengthen community responsiveness to limit negative social exposures (e.g., under-age access to alcohol)	Adolescent friendly reproductive health services, Early intervention for victims of IPV and community violence. Nutritional supplementation and structured economic support to ensure health during preconception period. Public works and entrepreneurial programmes to foster employment and educational opportunities.
Key intervention targets	Caregivers Health systems and services	Caregivers Early childhood development (ECD) services	Caregiver-child relationship School environment Community	Parental monitoring. Peer interventions School health services Community	Adolescent self-efficacy and access to services Higher education and employment
Prevention, promotion and intervention	Selective prevention through provision of facility and home-based mental health services for 'at risk pregnant women', including those at high risk of mental health problems, HIV, intimate partner violence, food insecurity.	Selective prevention in home-visiting services and well-baby clinics that deliver integrated care (including caregiver mental health support, support for early learning opportunities and responsive caregiving) aligned to the nurturing care framework. Access to additional resources to reduce harsh parenting.	Promotion of anti-bullying and anti-corporal punishment campaigns to raise community awareness. Selective prevention including low-cost, school-wide interventions to encourage physical activity, limit screen time, and encourage emotional regulation and cognitive control.	Selective prevention that limits exposure to social determinants of poor health. Monitoring of expulsion and punitive processes in education that systemically disadvantage children with mental health problems. Early interventions for mental health linked to parental monitoring and supervision. Interventions that promote parent-led sex education.	Access to early intervention for high prevalence mental health problems (depression, anxiety, conduct. substance use, psychosis). Continuity in care systems to ensure prevention of relapse.

Conclusion

While South Africa still has a way to go to advance clear and specific child and adolescent mental health services policies and services, life-course perspectives on mental health offers some important guiding principles for policy makers and service providers.

These include:

1. The early years of life are critical in determining adolescent and adult mental health outcomes, suggesting that universal and population-wide early years interventions could reap significant preventative rewards.
2. Interventions would benefit from being delivered through age-appropriate settings, for example, interventions in early childhood may be best delivered through the home, health facilities or early childhood development programmes, while interventions for adolescents may be better placed in schools or communities.
3. Mental health services cannot be delivered in isolation of other services and should not target individual problems but rather should be delivered alongside efforts to ensure stable and responsive relationships and safe, supportive environments with access to quality services.
4. Specific age groups have specific vulnerabilities which, if not eliminated, could have very negative consequences for society. Responding to this should involve universal approaches for all children. This in turn can be complemented with specific and selective prevention and early intervention efforts for 'at risk' groups.
5. Interventions which start early have cumulative positive effects, but if interventions are not maintained or exclude older age groups, then the benefits of early intervention can be lost or degraded. It is therefore critical to ensure that efforts to support children through developmental transitions are sustained throughout childhood and carried forward into early adulthood.

Case 9: Mental health over the life course – findings from the Birth to Thirty Cohort Study

Sara Naicker, Shane Norris & Linda Richter[i]

The longitudinal Birth to Thirty (Bt30) Cohort Study embodies a life-course approach and highlights critical opportunities to prevent and mitigate mental health problems at key stages of life – from preconception, pregnancy, infancy, and childhood, through to adolescence and adulthood.

This uniquely South African cohort began in 1990 and is the largest and longest running prospective birth cohort in Africa, studying the health and well-being of children born in the Greater Johannesburg area. Numerous high-quality, robust and age-appropriate mental health measures were used in the study to assess behavioural, cognitive and socio-emotional problems in childhood and adolescence, including depression, anxiety, somatization and social dysfunction in later life, and maternal depression.

This case highlights the key findings from Bt30 on the antecedents and consequences of mental ill health, organised by life stage from the study's inception to date.

The early years: preconception to age five

With three generations included in the cohort, Bt30 has the unique capacity to investigate the intergenerational patterning of mental health. Exposure to prenatal stress during the third trimester of pregnancy more than doubled the risk of two-year-old children developing behavioural problems.[31] These effects continued into late adolescence, where adolescents aged 17 – 18 years born to young mothers with high levels of prenatal stress had a greater likelihood of experiencing psychological distress.[32]

We also considered the mental health of mothers and links to mental ill health in their children. At age two, child behaviour problems were significantly associated with maternal postnatal depression in the first six months of a child's life, strongly mediated by the child's nutritional status.[33] Concurrent undernutrition was also independently associated with child behaviour problems, demonstrating the interplay between a child's mental and physical health. At age 10, postnatal maternal depression was again associated with poor child mental health. Children of mothers reporting postnatal depression were more than twice as likely to have substantial psychological difficulties than 10-year-olds born to mothers without postnatal depression, even when taking into account concurrent maternal depression.[34] Postnatal maternal depression was also associated with risk for increased and persistent internalising symptoms, such as depression and anxiety, from adolescence to adulthood in the cohort.[35] Taken together, the findings illustrate a consistent link between prenatal stress and maternal postnatal depression and the psychological maladjustment of their children over the first

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three decades of life. This supports the hypothesis that mental health problems operate intergenerationally and that early maternal mental health difficulties are linked to the development of mental health problems among their children later in life.[36]

These findings may be explained through a number, and possibly a combination, of mechanisms. Through genetic pathways, vulnerability to mental ill health can be passed from parent to child;[37] or epigenetic triggers may work in tandem with the early environment to produce dysregulation in physiological systems that increase the risk for mental health difficulties.[37] For example, high levels of exposure to the stress hormone cortisol early in life can alter how the body functions, where an individual then develops a sensitivity for cortisol at low levels and responds with anxiety and depressive symptoms. The experience of postnatal depression may also influence maternal responsiveness and other caregiving behaviours, leading to poorer psychological outcomes for children.[38, 39] Mothers who develop postnatal depression generally have more sources of stress and less support[37] which work together to produce negative developmental outcomes for children.[40] Predictors of postnatal maternal depression in the Bt30 cohort were found to be family and societal stress and difficulties with a partner during pregnancy.[31, 41] Interventions should therefore identify women with these risk factors, provide adequate support during and after pregnancy and should, where possible, include partners. A home-based intervention in a South African peri-urban setting showed positive impacts on the mother-infant relationship, infant attachment and on maternal depressive symptoms.[42]

Primary school years

Broader contextual factors have also been shown to influence behaviour problems in childhood. An assessment of the effects of socio-economic status and levels of community violence found that higher levels of exposure to interpersonal violence were linked to anxiety, depression, aggression and poor emotional adjustment among six-year-olds.[43, 44] Context was also associated with the prevalence and patterning of problematic behaviours. Compared to African American children in similar age groups, South African children in their early school years displayed more externalising problems such as disruptive behaviour – bullying, rule breaking and attention seeking, while African American children showed internalising problems such as anxiety, sadness and an over-dependence on adults.[45, 46] Individual child resilience and supportive family environments were found to mitigate the impacts of direct and indirect violence on children's psychological adjustment.[44]

The impacts of exposure to violence on children include physical ill health, psychological maladjustment and a broad range of social problems that reduce an individual's potential and well-being.[47] Using longitudinal data on a range of violence indicators across the Bt30 cohort, one study was able to demonstrate that South African children were exposed to widespread, continuous and excessive violence across all settings, including in their homes, schools and communities, among their peers and in their intimate relationships, and were also perpetrating similarly high levels of violence.[48]

Adolescence

Adolescence, loosely considered the second decade of life, is a phase of profound physical, cognitive, hormonal and socio-emotional change.[49] The age of onset of puberty – or pubertal timing – and the rate at which it progresses – or tempo – influences adolescent physical and mental health[50] through complex interactions between biological, social, cognitive and emotional factors. Using measures of pubertal development, data from Bt30 showed that early pubertal onset and increased tempo were associated with an increased risk for psychological distress as well as increased likelihood of risky behaviour.[51] One proposed pathway is the tension between advanced physical development and slower cognitive and emotional development which may place adolescents in situations where they do not have the capacity to make good decisions.[52] Early maturing adolescents are likely to benefit from interventions during their pubertal transition at the level of the individual, family and peers.[51] Interventions such as the Parenting for Lifelong Health (Sinovuyo) Caring Families Programme for Parents and Teens, PREPARE, and SKILLZ Street show promise for reducing risky behaviour and improving well-being for adolescents.[53]

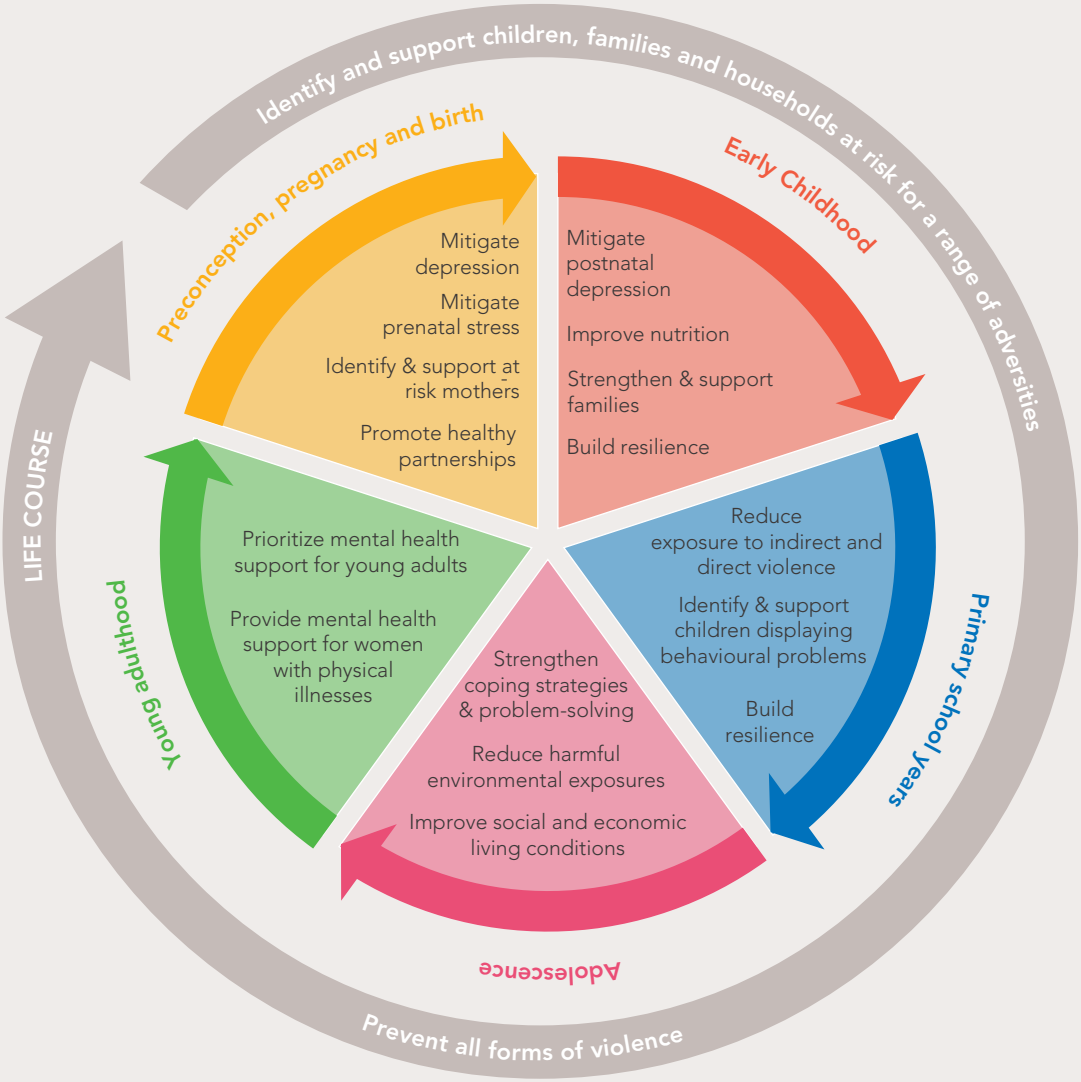
Environmental influences on the psychological adjustment of the cohort were also examined. Lead exposure continues to be a threat to health worldwide with the highest burden in low-middle income countries.[54] Children in South Africa, particularly those from poorer communities,[55] are exposed to lead through lead-based paint in toys, playground equipment, and other

sources[56-59] Two studies in the cohort show high blood lead levels and link these to increased antisocial and destructive behaviour among boys in early adolescence,[60] direct aggression among boys in mid-adolescence,[61] and increased risk for indirect aggression among girls in mid-adolescence.[61] South Africa gazetted a complete ban on lead in paint in October 2021, due to come into effect October 2022. This alignment with the WHO and United Nations Environment Programme has been welcomed but advocates emphasise the harmful legacy of old lead paint in houses, schools and playgrounds across South Africa and call for elimination of additional sources of lead.[62]

Young adulthood

In addition to demonstrating the effects of direct and indirect violence on mental ill health in early childhood,[43, 44] the impact of interpersonal violence on young women in the cohort was examined. Young women were twice as likely to display psychological distress if they reported high levels of exposure to interpersonal violence, compared to those with low levels of exposure.[63] The same measure of psychological distress (the GHQ-28) was used to assess co-morbidity with physical illness among mothers of the cohort. The presence of one physical illness was significantly associated with a risk for psychological distress, and the presence of additional physical illnesses increased this risk substantially.[64] These results point to the possible bi-directionality of physical and mental comorbidities where specific illnesses may precede psychological symptoms, and chronic untreated psychological disorders over the life course may increase the risk for physical illness.[65] These findings may underestimate the link between physical and psychological health given the exclusion of HIV from the assessment of physical illnesses and the well-

Figure 14: Findings from Bt30 on mental health throughout the life course



established association between HIV infection and mental ill health.[66] Apart from recognising that lifelong mental ill health contributes to the burden of disease and efforts to reduce the latter should address the former, these findings emphasise the need for increased mental health support in in the treatment of physical illness.

Other individual risk factors for mental ill health have been investigated in the cohort, for example, child sexual abuse measured prospectively among boys aged 11 – 18 years and mental health in young adulthood (age 22). Young men who reported sexual abuse as children were more likely to express overall psychological distress, as well as anxiety and depression, compared to men who did not report sexual abuse.[67] These findings were not significant when adjusted for social and personal vulnerabilities – such as height, pubertal timing, maternal education, father presence, and socio-economic status – which suggests that these factors may also play a role in mental ill health in adulthood.

The breadth of the Bt30 study made it possible to track indices of risk factors over the life course. One specific index is a measure of adverse childhood experiences (ACEs), which tracks the cumulative impact of the range of adversity children are exposed to, including direct and indirect violence, abuse, neglect and various forms of household dysfunction. ACEs were found to be highly prevalent in the cohort, whether measured prospectively or retrospectively.[68, 69] An analysis of ACEs and mental health in the cohort showed that the risk for psychological distress in young adulthood increased with the number of ACEs in childhood, and that young women were twice as likely to experience psychological distress even though they reported fewer ACEs.[70] Children living with single mothers, absent fathers and in poorer households were likely to experience higher numbers of ACEs.[69] Therefore, single parent families, families in poor communities and dysfunctional households may need additional support to mitigate the co-occurrence of ACEs that may act in combination to lead to mental health difficulties later in life.

Implications for policy and practice

The evidence from Bt30 has collectively demonstrated that mental health problems have their origins in early life, perhaps even before conception, and that they can be passed from parents to children intergenerationally through the interplay of social and biological factors. This can lead to persistent mental health difficulties, identifiable in childhood through to young adulthood. A number of important learnings can be drawn for policy and practice.

- Timely investment in mental health – to address the causes rather than the consequences of ill-health – leads to high, long-term benefits for both public health and economies.
- A life-course approach highlights multiple entry points for intervention:
  - Pregnancy and birth should be a healthy and positive experience for parents to provide the best possible start for their child. Support should be provided for mothers with high levels of family and social stress and little social support. Efforts should be made to include partners in any intervention, and the risk factors for postnatal depression should be assessed and addressed early.
  - A healthy and supportive environment in the early years fosters healthy adjustment and is particularly important for mitigating adversity. Recognizing the interplay between a young child's physical and mental health through holistic responses is critical to ensuring optimal development. The Nurturing Care Framework is an evidence-based framework that promotes children's health, nutrition, protection, learning, and socio-emotional development through guidelines for intervention at the micro- and macro-levels, including in the home, at ECD centres, schools, and beyond.
  - Well-adjusted adolescents are able to make choices that could delay the onset of negative health behaviours. Intervening at vulnerable transition periods, such as the onset of puberty, can provide them with the resources to cope, recover and thrive, particularly in contexts of hardship and adversity.
- Mental ill health is prevalent in young South African adults, is exacerbated by current stress, and often co-occurs with physical illness. More effort should be made to support young adults with mental ill health, not least to prevent the intergenerational transmission of psychological difficulties.
- The pervasiveness of violence in children's lives and its link to poorer mental health outcomes warrant intensive violence prevention efforts in all settings.
- Interventions to mitigate the impact of adverse childhood experiences should be directed at individual and household level, as well as the broader community.

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