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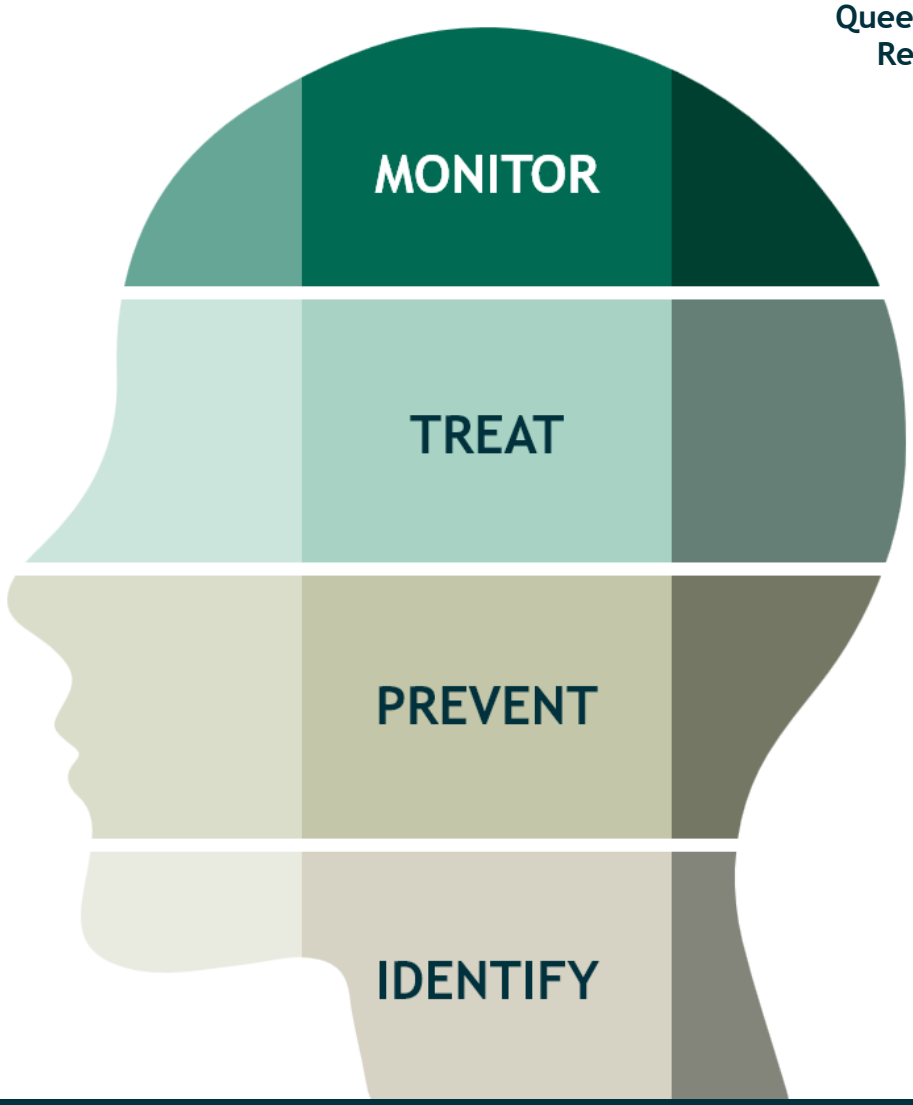
Queensland Child Death Review Board (CDRB)



Highly vulnerable infants, children and young people:

A joint child protection mental health response to prevent suicide

A review of recent research and discussion of priority areas to reduce the risk of suicide in this vulnerable group.

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Acknowledgements

The author recognises the country north and south of the Brisbane River as the land of the Turrbul and Jagera people, and pays his respect to the elders past, present and future of this and other regions in Queensland. Further, he acknowledges that health and other service providers must continue to focus on closing the gap between the psychosocial, educational and justice outcomes of Indigenous and non-Indigenous people.

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About the author

Professor Brett McDermott is a medical graduate from the University of Tasmania who trained in psychiatry in the UK and Sydney and holds clinical qualifications in child, adolescent and adult psychiatry. Professor McDermott continues to fulfil clinical as well as academic responsibilities. Professor McDermott has had numerous national appointments (e.g., Member National Mental Health Service Planning Framework Expert Panel (2016-17); Member NHMRC PTSD Guideline Editorial and Advisory Committee; Member Federal Government Mental Health Expert Reference Group (2015); Chair NHMRC-BeyondBlue Youth Depression Clinical Practice Guidelines Working Group; Director, BeyondBlue the Australian National Depression Initiative (2006-2016). International appointments include visiting Professorships in Malaysia and China (Shanxi University, Shanxi Medical University and Taiyuan Hospital) and a By-Fellow at Churchill College, Cambridge University, UK. His research interests include mental health service development, PTSD and stress, and adolescent depression; and has published over 100 journal articles and book chapters on these topics. Clinical interests are in similar areas and for 14 years Professor McDermott was the Executive Director of a large Brisbane Child and Youth Mental Health Service.

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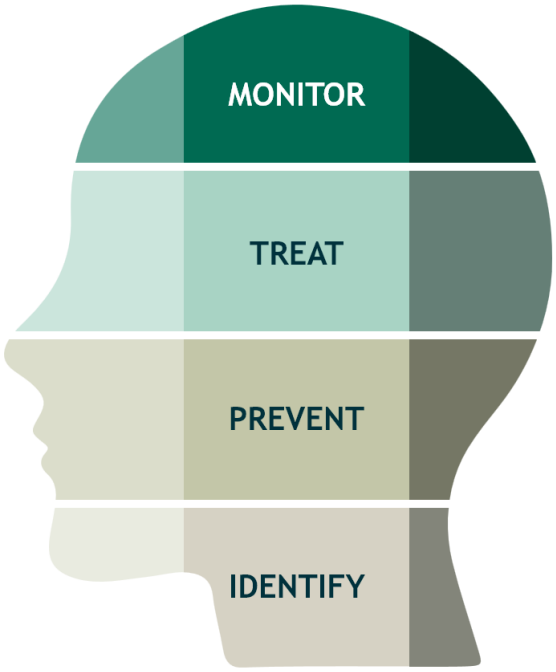


1.1 Introduction

The aim of this report is to provide insights from recent research and clinical cases about how our responses to suicidal youth known to the child protection system can be improved and ideally lower the rate of suicide in this group. There are two compelling reasons why this topic is extremely important. Firstly, there are very large numbers of Australian children in contact with child protection services. Indeed, in the year 2019-20, 1 in 33 Australian children were in contact with child protection services which equates to 174,700 children. Secondly, from an Australian mortality perspective, suicide is the leading cause of death in Australian among 7 to 17-year-olds. Suicide is responsible for approximately one third of mortality in that age group.

A significant correlate of completed suicide is having a mental health disorder, with approximately 1 in 50 Australian youth experience at least one mental health disorder. High-risk groups include Indigenous Australians; where the suicide rate is 4 to 12 times higher than the non-Indigenous rate. Young people in juvenile justice are at high risk and those who abuse alcohol or substances. This report will very clearly detail a significantly higher risk in children with an adverse childhood experience (ACE). ACEs include the experience of verbal, physical and sexual abuse, and physical and emotional neglect. The report will detail the complexity of some of these interactions. For example, there is a direct effect from abuse to suicidal thinking, as well as indirect effect from abuse to disengagement with school, lower educational and employment outcomes, self-medication with drugs and alcohol, and cumulative stresses that lead to suicidal thinking.

1.2 Adverse Childhood Events and Mental Health

When considering the relationship of any ACE and mental health there are very clear research findings relating psychological neglect or the experience of sexual abuse with depression. Other research has correlated abuse and neglect with posttraumatic stress disorder (PTSD) and psychotic symptoms. In the suicide literature there is a strong association with suicide attempts before the age of 18 and ACE Indeed, one large study found that a history of maltreatment was more influential on suicide behaviour than a lifetime history of mental illness. Some research suggests that suicidal ideation is occurring at earlier ages and indeed is now seen in primary school children.

Much research has commented on risk factors and factors that link adverse childhood experiences to mental health, with two overarching themes dominating the research. Caregiver mental illness is associated with a broad range of offspring mental health conditions. Caregiver mental illness is more likely to be reported in mothers mainly due to the absence of fathers in studies samples as well as in the lives of many children known to child protection services. However, maternal mental illness also more than doubles the likelihood of an allegation of maltreatment. Similar to many interactions in this field, maternal mental illness has a direct adverse effect as well as an adverse secondary effect. A recurrence of abuse notifications was also related to parent mental health or drug problems. The other major theme is caregiver experience of their own maltreatment. There are research findings of increased offspring mental illness in parents who have themselves been maltreated. Similar to the finding with maternal mental illness, a recurrence of abuse notifications was also related to the parent having their own abuse history.

1.3 Foundation biological information

There is increasing evidence of changes in gene function (epigenetic mechanisms) due to the experience of ACEs including abuse and neglect. These changes include alterations in an individuals' response to stress, cognition, relationships such as security of attachment, and addictive behaviour. Epigenetic changes have been correlated with psychopathology in adults including depression and borderline personality disorder.

There is now a substantial body of research linking ACEs to acute and chronic biological change. This includes accelerated cellular ageing, changes in cardiovascular indices such as blood pressure and more pro-inflammatory immune system changes. These effects create increased physical morbidity and early mortality. This is likely to be worse in Indigenous people. Parental warmth may be a protective factor to this biological change.

Neuroimaging studies have consistently demonstrated abuse related brain changes with the most implicated functions being executive functioning, emotional regulation and impulse control. Some changes are very large, for instance 12% to 18% reduction in brain volume related to abuse. New findings show not only grey matter reduction but changes in white

matter that connects brain regions, as well as evidence of increased impulsivity on brain function imaging.

1.4 Understanding complexity and child death review

Given the complexity of the lived experience of maltreated children and recent epidemiological and biological research findings, this report includes two models that help draw together and summarise this complexity. Both models (the 'omnibus model' and 'developmental' model) are bio-psychosocial-cultural models that also help track an individual's development over time.

These models are applied to the review of the death by suicide of eight young Queenslanders. Key findings from this review were an equal number of female and male deaths, unusual given the usual preponderance of completed suicide in males. Half of the cases were of Aboriginal or Torres Strait Islander young people which is consistent with the increased suicide rate in that population. Other characteristics that were similar to the research findings included evidence of clear premeditation in several of the cases, all individuals completed suicide through means that were very high risk (7/8 died by hanging), high to very high levels of ACEs that often began very early in life, clear family histories of mental illness or substance abuse, and for many a family history of relatives who completed suicide, often also by hanging. A detailed review of the mental health of individuals was hampered by the lack of access to Queensland Health notes. However, is was likely that half of the group had a mental health diagnosis and were seen for mental health issues by either a GP or by child and youth mental health services. A theme of these interactions was difficulty engaging the young person in the offered model of care.

1.5 Review of policies, child protection mental health interaction and future priorities

The review included consideration of 19 policies and procedures from the departments of education, juvenile justice and child safety. Almost without exception these policies were well written and detailed clear expectations and responsibilities. Most, in the normal cycle of review and re-issuing policies, would benefit from incorporating the understanding of cumulative suicide risk over time, and recent evidence about the psychological and biological implications of ACEs. A general theme was that intersectoral collaboration was not enshrined in these documents. This is despite intersectoral collaboration being clearly in the best interest of the child.

Considering the mental health - child protection interface; the increased understanding of the rates of mental illness in the child protection population establishes a clear need for service provision, across both physical and mental health to these consumers. A key problem thus far has been the perception that child protection consumers do not engage with current

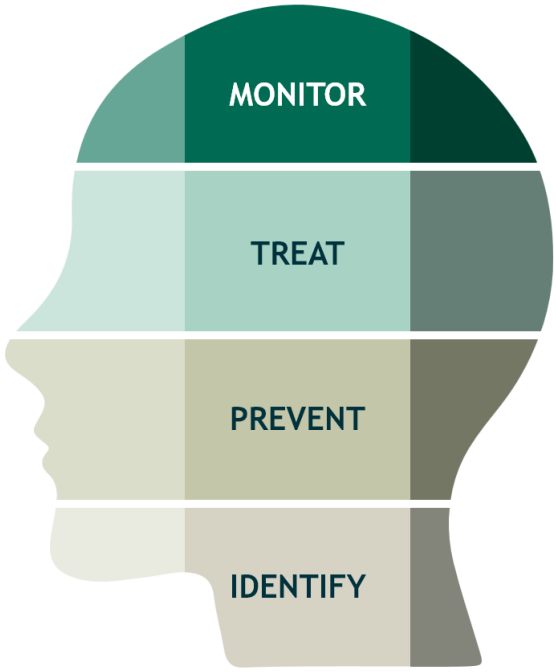
child and youth mental health service provision models. Further, the range of mental health challenges in this consumer group are considered not responsive to current mental health interventions. It is noted, however, that in Queensland there have been considerable steps taken to remedy this including the rollout of Evolve Therapeutic Services. From an international perspective there are also several promising services specifically for children in care with an increasing evidence base.

The report concludes with seven priority areas to consider. These include, potentially for the first time in the world, developing a shared trauma-informed framework across all services and departments that deal with young people including health (paediatrics and mental health), child protection, education and juvenile justice. This could be followed by a shared professional development program with different tiers depending on the degree of clinical competence required by the practitioner. Other priority areas include comments on cultural change to increase intersectoral collaboration, investment in having access to and creating data that can rapidly inform services of emerging risks and opportunities, advocacy for a major expansion of services to parents and infants/preschool children and similarly engaging with Indigenous elders, parents, consumers and community members to create new service initiatives that will engage this group of high-risk consumers.

1.6 List of acronyms

ACE	Adverse childhood experiences
ADHD	Attention deficit/hyperactivity disorder
AL	Allostatic load
AO	Allostatic overload
BPD	Borderline personality disorder
CDRB	Child Death Review Board
CS	Completed suicide
DSH	deliberate self-harm
DTI	Diffusion tensor imaging
ETS	Evolve therapeutic services
MRI	Magnetic resonance imaging
OCD	Obsessive compulsive disorder
OFC	Orbitofrontal cortex
OOHC	Out of home care
PTSD	Posttraumatic stress disorder
SES	Socioeconomic status
SI	suicidal ideation

2 INTRODUCTION



2.1 Suicide in Children and Adolescents

Suicide is a rising concern within the child and youth population. In 2018 suicide was the leading cause of death of Australian 7-17-year-olds (AIWA, 2020). In 2019, over one third of all deaths in people aged 15-24 were due to suicide ABS, 2019). Experiencing a mental health disorder is strongly correlated with suicide. One in 50 Australian youth experience a severe mental health disorder (Lawrence et al., 2015). From an international perspective approximately 14% to 40% of 10 – 19-year-olds meet criteria for one or more mental health disorder (Lawrence et al., 2015; Collinshaw et al., 2004; Kessler et al., 2012). Prevalence rates vary depending on the specific disorder and cohort studied. The most frequent presentations in Australia are ADHD, Anxiety, Major Depressive disorder (MDD) and Conduct disorder (Lawrence et al., 2015). There is evidence the rates of adolescent mental illness steadily increased up to the global financial crisis (GFC, 2008) (Collinshaw et al., 2004; Collinshaw et al., 2014; van Geelen et al., 2016). Features of mental health disorders in youth that are particularly problematic include frequent relapses (Pisani et al., 2012) and the associations with functional and social impairment (van Geelen et al., 2016; Caruana et al., 2018). A factor that confounds attempts to provide services is youth help-seeking for mental health issues is very low (Pisani, et al., 2012).

2.2 Known risk factors

Deliberate Self Harm (DSH), most commonly presenting as either self-cutting or self-poisoning, is a significant adolescent suicide risk factor (Pisani et al., 2012; Scoliers et al., 2009; Runeson et al., 2016; Kolves et al., 2018). Between 8-10% of 12-17-year-olds report an occasion of DSH within the last twelve months which increases to 11.6% in 16-17 years-

olds (20)(Zubrick et al., 2016). In a New Zealand adolescent inpatient group DSH and/or suicidal ideation were the major cause of admissions (Park et al., 2005).

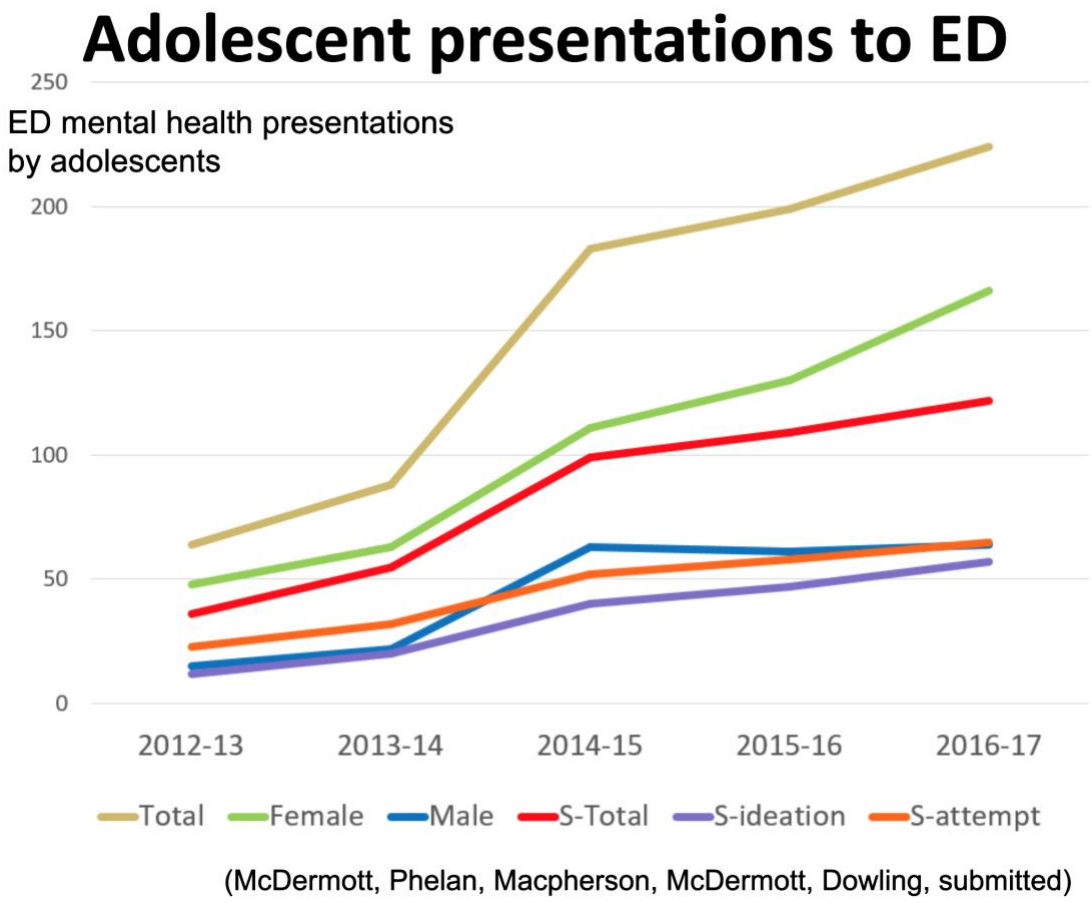


Figure 2.1 *Mental health presentations by adolescent in North Queensland, 2012-2017*

Across many jurisdictions both the rate of presentations by adolescents to hospital emergency departments (see Figure 2.1, McDermott manuscript under review) and rates of DSH are increasing.

Some groups are at particularly high risk. For example, Indigenous children and youth are a higher risk of suicide in part because they have a higher prevalence of mental illness. A survey of Indigenous people across all age groups in Western Australia reported 54% experienced a mental illness (Parker, 2010). Milnes and colleagues reported more than double the rate of psychological distress (33% versus 14%) in Indigenous versus non-Indigenous young adults (2011). This markedly elevated prevalence is consistent with higher rates of mental health risk factors including levels of abuse, neglect and substance use (Parker, 2010; Ivancic et al., 2014). The Indigenous suicide rate is between 4-12 times greater than in non-Indigenous youth (Korff, 2020; Parker, 2010; Soole et al., 2014; Reifels, 2014). In 2019 the differential rates of suicide were 8.3 deaths per 100,000 Aboriginal and Torres Strait Islander children compared to 2.1 per 100,000 for non-Indigenous children (ABS, 2019).

There is strong anecdotal evidence that youth involved in the juvenile justice system are at greater risk of completing suicide. However, there is less research on this at-risk group. What research there is suggests this group often has diagnoses of oppositional defiant disorder or ADHD as children, and a diagnosis of conduct disorder or emerging antisocial personality disorder when adolescents. What is becoming clearer is the proportion of youth in juvenile justice settings that are not 'neuro-typical'. In an Australian youth justice detention setting up to half of youth had borderline or low IQ (Haysom et al., 2014). In non-custodial juvenile justice settings low IQ and deficits in executive functioning and memory (Moffatt, 1990) and the relationship of these challenges with impulse control (Johnson et al., 2015) has also been reported. There are also increasing reports of youth with fetal alcohol spectrum disorder (FASD). In a Western Australian custodial setting 36% of young people met diagnostic criteria for FASD; with 89% meeting at least one FASD criteria (Bower et al. 2017).

This report focuses on suicide in children known to Child Safety. A theme that will be expanded upon throughout the report is that this is a matter of great significance given the prevalence of ACE and the number of young people who come in contact with the child protection system due to these experiences. During 2019-20, 174,700 Australian young people (1 for every 33 Australian children) received child protection services (AIHW, 2021). This very high number of children in protection varies on a yearly basis, often secondary to changes in reporting practices, but the order of magnitude remains similar year on year. These numbers are also very similar to youth self-report. In a recent large Swedish study of 18-year-old school children 20.9% affirmed sexual abuse of any kind and 31.2% physical abuse. Rates of psychological abuse were higher in all categories of students in out-of-home care (OOHC) (Tordon et al., 2019).

2.3 Comment on report methodology

The aim of this report is to provide a comprehensive update of new research in the areas of children in contact with child protection services, including those in out of home care and suicide. The focus is on research that published empirical data over the last 20 years that will inform on suicide and priority areas to prevent suicide. The information gathered is summarised into overarching constructs: epidemiology and aspects of neurobiology (genetics and epigenetics, 'allostatic load' and neuroimaging).

It is important to acknowledge that the child protection area has benefited from thousands of articles from senior clinicians and administrators who have published narrative reviews and opinions that provide extremely valuable insights and advice about numerous aspects of this field. It is outside both the scope and purpose of this report to consider this literature in depth.

The major subject areas of the report have been investigated through a systematic review process. This is inclusive of the PRISMA guidelines, reviewing multiple databases, searches

using recommended MeSH terms, selecting papers based on clear inclusion and exclusion criteria and the paper's scientific quality.

For example, a systematic review was undertaken to summarise research on the relationship between being an out-of-home-care (OOHC) child and suicide. Five databases (Medline, PsycInfo, PubMed, Scopus and Web of Science) were searched, and results were then screened for relevance. The full process is illustrated in Figure 2.2.

Papers were included if they were written in English, published after 2000, the population included (and referred to) OOHC children/ children in care/ looked after children (LAC) or foster care and focused on suicide.

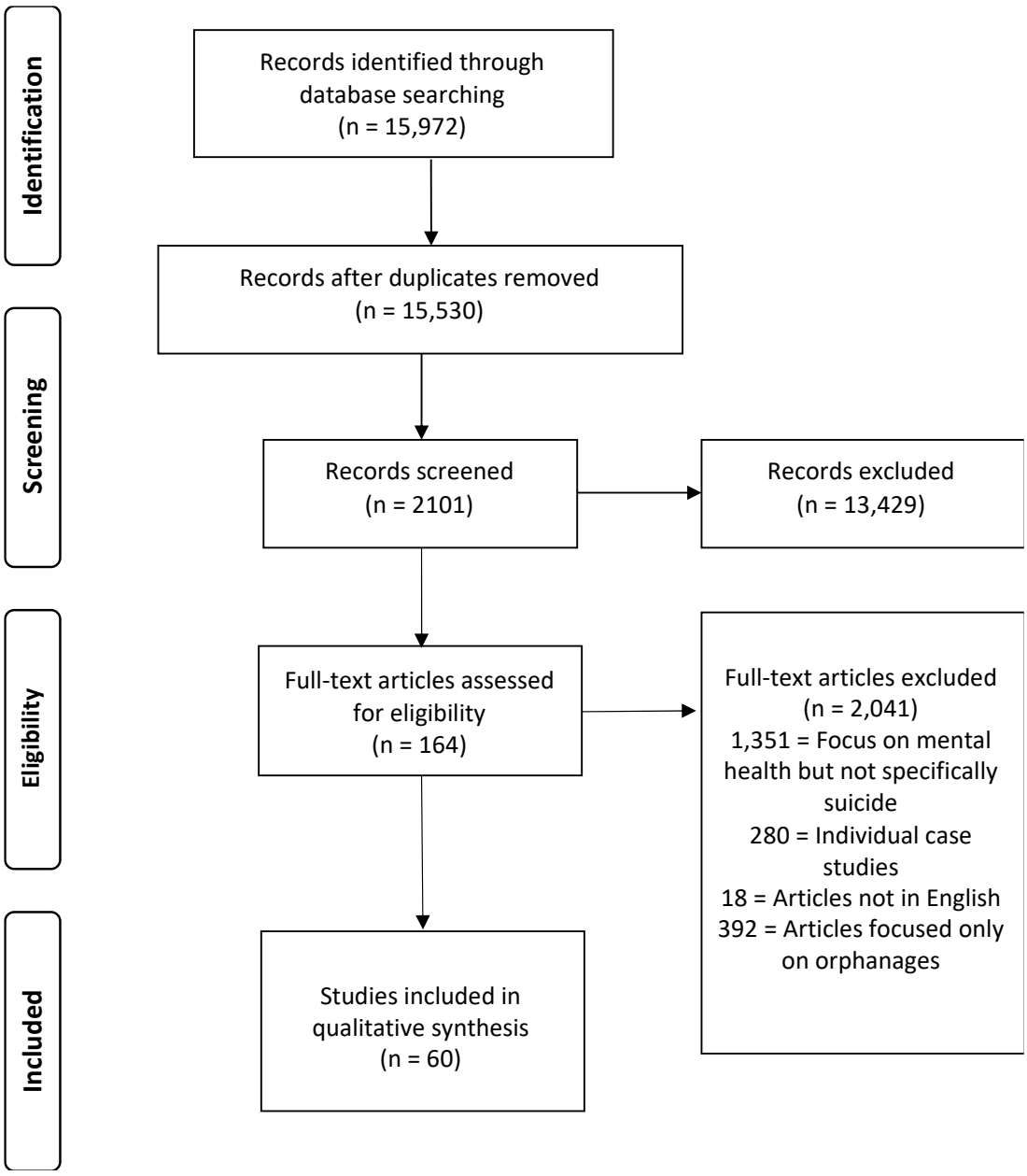
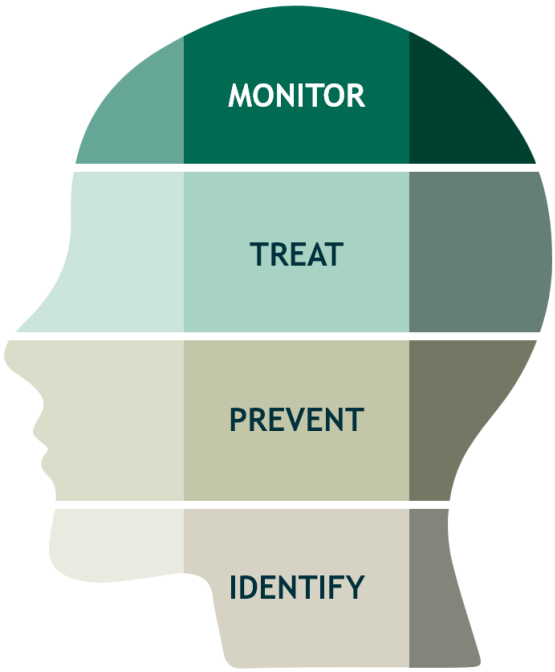


Figure 2.2 *Review process and identification of papers to include in systematic review*

3

ADVERSE CHILDHOOD EVENTS AND MENTAL HEALTH



3.1 Adverse Childhood Experiences (ACEs)

The published literature on the mental health consequences of experiencing some form of maltreatment can be difficult to navigate given numerous categories and classifications which all have an inherent logic. Published reports could be on the relationship of mental illness and self-report of maltreatment, the perception by caregivers or professionals that a child has been maltreated, objective evidence of maltreatment following some process of inquiry, the mental health of those reported to child protection services, or those with substantiated child protection notifications, or of individuals in various forms of out-of-home care.

One methodology that overarches all these factors is a determination of the number of adverse childhood experiences (ACEs) an individual has experienced. ACEs, which are inclusive of both subjective experience and observation by others, is a summary of burden of adversity on an individual.

ACEs were originally investigated to understand the key drivers of obesity in individuals cared for by an American health provider. Soon after it became clear the concept had a wider application. Now there are published reports of significant dose response relationships between ACEs and a range of physical and mental health presentations later in life (Boullier & Blair, 2018; Felitti et al., 1998; Sheikh, 2018; Thayer et al., 2017).

Usually, 9 types of adversity are included in an ACE score: five relate to the household (substance abuse, parent separation or divorce, parent mental illness, domestic violence and criminal behaviour); three relate to abuse (psychological, physical and sexual) and two relate to neglect (emotional and physical).

ACE = Adverse Childhood Experiences

Longitudinal study, recruited 1995-97 (CDC & Kaiser Permanente). Before your 18th birthday…

Abuse	1	Emotional abuse
	2	Physical abuse
	3	Sexual abuse
Neglect	4	Emotional neglect
	5	Physical neglect
Household dysfunction	6	Mother treated violently
	7	Household substance abuse
	8	Household mental illness
	9	Incarcerated household member

3.2 Focus on mental health symptoms and diagnoses

There should be no doubt that the experience of being a young person who was abused, whether this subsequently led to living in out of home care or not, conveys a significantly increased likelihood of experiencing a mental health disorder. From a general psychopathology perspective, 'internalising problems' (generally equating to depression and anxiety symptoms) in 1,730 youth reported to child welfare in the US were 1.8 times more likely if they had experienced sexual abuse (Garcia et al., 2017). In a sample of 2,776 adolescent participants in a US national survey who had contact with child protection services, 40% of the variance of depression was explained by combination of caregiver psychological neglect and isolation from peers (Christ et al., 2017). In a subsequent study of 276 female colleague students, emotional abuse was the only abuse type significantly related to depression symptoms and emotional dysregulation in adults (Christ et al., 2019). Analysing World Health Survey data (n = 27,017) childhood adversity including abuse, neglect and parent mental illness nearly doubled (OR = 1.8) the likelihood of later PTSD (McLaughlin et al., 2017). Following up 629 abused children from age 12, 25% exhibited at least one psychotic symptom at age 18 with sexual abuse demonstrating a strong link with the experience of hallucinations (Beasley et al., 2021).

3.3 Suicide, self harm

Numerous groups have investigated suicide ideation, attempts and completed suicide in individuals with histories of maltreatment, but who did not experience out of home care. Much of this literature has been analysed on very large representative population samples. Hoertel and colleagues analysed the second wave of the US National Epidemiologic Survey on Alcohol and Related Conditions (n = 34,629) and reported suicide attempts before the age of 18 were more strongly correlated to childhood maltreatment than to a lifetime psychiatric disorder. Some studies specifically investigated samples of individuals, all of whom had a history of maltreatment. Of 1,050 adolescents with a history of maltreatment, suicidal ideation was predicted by alcohol use and deviant peer affiliation (Sellers et al., 2019). From a US national survey of children investigated by child welfare agencies, youth

with suicidal ideation were more likely to be disconnected from peers and caregivers 18 months later (Fulginiti et al., 2018). One inference is the causal pathway of suicidal ideation is circular given social isolation is itself a risk factor for suicide in youth.

A new concern is the age of onset of suicidal ideation. A much-referenced paper by Nock and colleagues reported very low prevalence of suicide ideation attempts or planning before age 12 (2013), More recently Paul and Ortin reported suicidal ideation in 4- and 6-year olds who had been maltreated (2018).

3.4 Risk Factors

Research has established numerous constructs that convey increased risk of mental illness, both symptoms and disorders, in individuals who have been maltreated. Caregiver's own experiences of abuse is clearly implicated. Of 791 children involved in child protection services, Sierau and colleagues reported child conduct problems was predicted by their caregiver's experience of being themselves maltreated (2020). Emotional problems in children were also predicted by caregiver maltreatment and caregiver anxiety/depression symptoms (Sierau et al., 2020). The design of Bodeker and colleagues' study included objective measurement in that caregiver self-report of maternal early life maltreatment was related to teacher's report of child psychopathology (2019). Arditti and colleagues reported increased prevalence of five mental disorders (mood, substance abuse, anxiety, alcohol use and antisocial personality disorders) in children if at least one parent reported a childhood traumatic life event (2020). Increased offspring mental health care and psychiatric medication prescriptions have also been reported in a large (n=485,000) sample of military children, especially if a parent was diagnosed with PTSD (Hisle-Gorman, et 2019). In summary, emerging evidence has consistently found a link between ACEs, maternal mental health and the subsequent mental health presentations in their offspring. Statisticians would call this a 'main' effect: poor maternal health leads to poor offspring mental health.

There is also emerging evidence that poor maternal mental health increases the likelihood of child maltreatment, which in turn is related to poor offspring mental health. Numerous investigators have conducted data linkage studies looking for relationships between parent mental health and higher rates of maltreatment in offspring. In an analysis of 11,652 Canadian child protection investigations, maternal mental health concerns were present in 19.7% of cases and controlling for a range of other factors, maternal mental health issues were significantly associated with substantiation of reports (Westad et al., 2012). A similar data linkage approach in Western Australia reported 'almost half' of children with an allegation of maltreatment had a mother with a mental health service contact. Independent of other factors maternal mental health increased the likelihood of an allegation by 2.6 times (OR_{adj} 2.6, 95% CI 2.50 – 2.80) (O'Donnell et al., 2015). Mental health diagnoses were numerous including developmental, personality and substance abuse disorders and intellectual disability in childhood (O'Donnell et al., 2015). An Australian data linkage study

of 9,608 children followed for one year reported increased risk of recurrence of child notifications if a parent experienced mental health problems, drug use or themselves were maltreated as a child (Jenkins et al., 2018). Kohl and colleagues linked metal health and social services data in the US; following 4,895 mother-child dyads for ~15 years and they reported 67% of children had a new report during that time period (Kohl et al., 2011). Similar to O'Donnell and colleagues, several diagnoses were implicated. Mood and anxiety disorders significantly increased the probability of a new report whilst anxiety disorders increased the risk of child placement (Kohl et al., 2011).

When discussing risk factors, several caveats are important. Complexity of trajectories over time is the norm when considering longitudinal pathways of maltreated children. Whilst the relationship between 'distal' variables such as child maltreatment, ACEs and later substance abuse are reported, proximal variables are also influential. Sellers and colleagues reviewed 1,050 adolescents from a US national well-being survey of maltreated children and reported the risk of both alcohol and marijuana use was also related to exposure to deviant peers (2019).

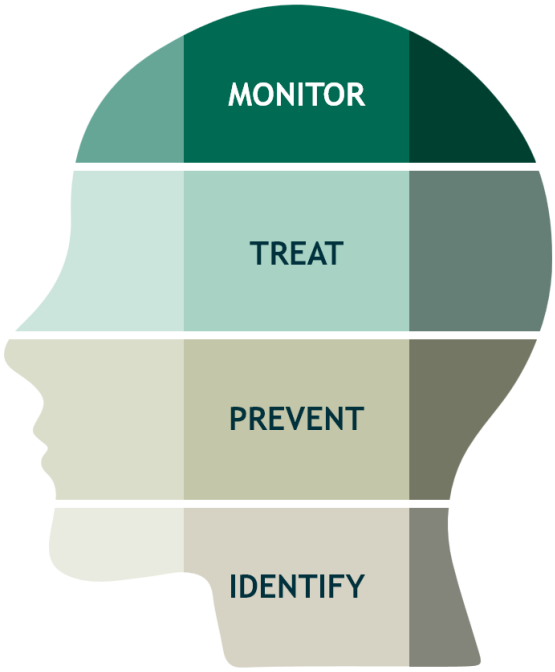
There are also likely to be differential risk patterns over time given that every individual's experience of adversity is different, both in what occurred and their perception of a traumatic event. Adverse outcomes also differ by type of abuse, whether single or multiple, frequency and the timing of the event. Barbosa and colleagues investigated the cumulative risk of ACEs into adulthood and found 43.7.% of their participants were in the medium to high-risk categories. They published four risk profiles: highly abusive and dysfunctional (3.3%); emotionally abusive alcoholic with parental conflict (6.0%), sexual abuse only (4.3%) and emotionally abusive and alcoholic (30.3%) (Barbosa et al., 2018). Each high-risk profile was associated with poor adult psychosocial outcomes.

3.5 Mental health service use

The published relationships between ACEs and increased mental health symptoms and diagnoses are consistent with various aspects of mental health service provision. dos Reis and colleagues reported on 5,136 individuals less than 18 years with a history of experiencing family adversity. They found both anti-depressant and anti-psychotic use was higher in the most socioeconomically disadvantaged group, the overall likelihood of polypharmacy was 2.7 times increased (2015). Another study found that one of several predictive factors for children admitted to psychiatric residential treatment facilities in the US (n = 105,982 over a 5-year period) was a trauma-related diagnosis (Rose et al., 2017).

4

CHILDREN IN CARE AND MENTAL HEALTH



4.1 Symptoms and diagnoses

Four studies were identified that specifically looked at populations of children in out-of-home care and their mental health. Two of these looked at the broad classification, common in children and adolescent psychiatry, of internalising versus externalising disorders. Internalising disorders are roughly depression and anxiety disorders. Externalising disorders are conditions which are more obvious to the observer such as the disruptive behaviour disorders (oppositional defiant disorder, conduct disorder and attention deficit disorder). Cohen and colleagues analysed data from a large US longitudinal study of 657 adolescents involved in the welfare system many of whom were in out-of-home care and found both internalising and externalising symptoms were predicted by either their own self-report or parent report of emotional abuse. Self-reported neglect predicted more internalising (anxiety and depressive) symptoms (Cohen et al., 2021). In a sample of Spanish adolescents in residential care also found internalising symptoms which were associated with poly-victimisation and fewer self-resources. Community support was an important factor which mediated the relationship between victimisation and internalising symptoms (Segura et al., 2017).

The overall likelihood of a mental health disorder in children known to child protection services was further clarified with a very large (n=74,462 children) database from New South Wales. Of these group 1,148 children were in out-of-home care. Children who had early contact with child protection services were almost 3 times more likely to have a mental health disorder in middle childhood (OR 2.72, CI 2.51-2.85). The likelihood of a mental health disorder was even higher (5.25 times) for children have been placed in out-of-home-

care (OR 4.46-6.18) (Green et al., 2019). These findings are very similar to a West Australian data linkage study (n=524,534 births); children with a child protection contact had approximately five times more mental health diagnoses (20.9% versus 3.6%) (Maclean et al., 2019). Unlike the Green study, the results of MacLean showed no difference between children with a substantiation of maltreatment who did not enter out-of-home care with those that entered care. These very high rates of mental health problems of children in out-of-home care were replicated in a small study of youth in Jordanian care centres; 53% of adolescence experienced some type of mental health problem, 31% with depression and 23% with anxiety (Gearing et al., 2013). Of a sample of 1,776 children in out-of-home care in Los Angeles county, 33.3% had a mood disorder, 21.7% an anxiety disorder, 11.1% ADHD and 11.2% a behavioural disorder (He et al., 2017). In another Californian sample of 706 adolescents in foster-care 47.3% screened positive for a psychiatric disorder (Okpych et al., 2018). Gregor and colleagues replicated these findings in 335 adolescents in residential care units in Norway with significant increases in a wide range of diagnoses including Asperger's syndrome, conduct disorder, depression, dysthymia and anxiety (2015).

Several authors focused on individual conditions. Depression was the most common diagnosis in the analysis of youth in Jordanian care centres (Gearing et al., 2013) and children in care in Los Angeles (He et al., 2017). Analysis of a US longitudinal study found that depression in children in OOHC was associated with trauma across all racial/ethnic groups (Washburn et al., 2018). PTSD was significantly associated with reports of both single and multiple potentially traumatic events in Norwegian foster children (Lehman et al., 2019). In 342 Japanese children living in residential care facility, depressive symptoms were predicted by the experience of maltreatment and were inversely related to having a secure attachment (Suzuki & Tomada, 2015)

Sleep disturbance can be a symptom of a mental health disorder, for example both difficulty initiating sleep and over-sleeping are often reported by depressed adolescents. A sleep disorder also may be comorbid with a mental health disorder.

Several studies have investigated sleep in OOHC children. Okada and colleagues investigated sleep in 273 abuse children in a Japanese residential facility and found 40% had sleep related symptoms and 19 had a suspected sleep disorder. Sleep problems were particularly high amongst children with antisocial or depressive behaviour (2018). In 350 adolescents under care of child welfare and residing in a residential facility in Québec, sleep disturbances were common and particularly associated with a past experience of sexual abuse (Langevin et al., 2018).

4.2 Impairment

In a large data linkage study of 14,000 Swedes born in 1953, 881 spent some time in OOHC. Two thirds of this group did not belong in the two most disadvantaged profiles as adults suggesting many in out-of-home care do reasonably well. Nevertheless, overall this group

had an elevated likelihood of lower education, higher unemployment and requiring comparatively more social assistance (Brannstrom et al., 2017). These findings are similar to a US sample of preadolescence where prior OOHC was associated with poor academic achievement (Petrenko, 2012).

As previously mentioned, there is an established relationship between maltreatment and being in the Juvenile Justice System. In 5,720 children and adolescents placed in OOHC in Florida, individuals with a mental health disorder were 80% more likely to experience recidivism in the juvenile justice system. The strongest predictor was those with a conduct disorder (Yampolskava, Chuang, 2012)

4.3 Risk factors

Placement instability predicted PTSD, alcohol and other substance abuse and suicide attempts in 706 adolescents in foster care in California (Okpych et al., 2018). Note it is very likely that this relationship is bi-directional. In 251 adolescents who participated in a longitudinal study of abuse and neglect, more severe post-traumatic symptoms in late childhood mediated unstable placement patterns in early adolescence (Villodas et al., 2016). Stability of placement was predicted by the presence of "at least one loving and supporting family member" (16% fewer replacements) and attending a school which provided tailored educational support (13% fewer placements)(Summersett-Ringgold et al., 2018).

4.4 Focus on suicide

The rate of suicide increases when looking at particularly vulnerable populations, such as children in out of home care (OOHC). OOHC children already face a series of additional challenges due to experiences of trauma prior to (and sometimes during) their time in care and often struggle with employment and severe mental illness even when they have left care (Alderson et al., 2019; Buys et al., 2011; Dixon, 2008; Kalland et al., 2001).

As previously summarised there is strong link between ACEs and suicide (Fuller-Thomson et al., 2016; Hamilton et al., 2015). OOHC children are statistically more likely to have experienced one or more ACE prior to entering the welfare system (i.e., physical, or sexual abuse or parental domestic abuse) (Chavira et al., 2010; Cousins et al., 2010; Greger et al., 2015; Pottick et al., 2005). In fact, one study found that for every unit increase in an ACE score, the risk of suicide increased by 60% (Dube et al., 2003).

Other risk factors include suicidal ideation (SI) and DSH. While SI and DSH are known indicators of eventual completed suicide (CS), not all DSH is with suicidal intent (Kasen, Chen, 2019; Katz et al., 2020; Steeg et al., 2014). A wider systematic review will illustrate the statistically significant risk and protective factors across this specific population.

Across a varied not-in-care sample, between 4.1%-23.5% of all adolescents reported at least one suicide attempt, while between 2.1% and 15.3% reported significant self-harm (Kokkevi et al., 2012). When compared to an OOHC population, these rates increase to between 6.1% and 35.4% for suicide attempts and 48.0% for suicidal ideation (Anderson, 2011; Brown, 2020; Chavira et al., 2010; Evans et al., 2017). Rates of suicide within the OOHC population vary globally and depend on the research methodology used.

However, overall suicide rates for children in OOHC are significantly higher than for the not-in-care population. In some cases, this is reported as almost three or four times as high (Brown, 2020; Omar, Merrick, 2013; Palmer et al., 2021).

A summary of the risk factors found in empirical studies which included children in OOHC or children who had some involvement with the welfare system in this review is in table 4.1. These risk factors are broken into five domains; individual, family, community, school, and peer (Burns, Patton, 2000; McNamara, 2013). Overall, OOHC children reported significantly more suicidality (suicidal ideation, attempts and self-harm) compared to non-OOHC populations.

4.5 Suicide Interventions

There is currently little evidence for any intervention specifically focused on OOHC children. There are a series of programmes offered throughout school (which this group would generally have access to), however the evidence on these is unclear (Brown, 2020; Burns, Patton, 2000). Generally, suicide interventions are considered prevention rather than an early intervention and include wider methods such as reducing access to the means of completing suicide (Burns, Patton, 2000). In a standard adolescent population, these have previously included school-based psychoeducation sessions and training for teachers and carers (Brown, 2020; Robinson, 2008; Silva et al., 2016). These mechanisms are difficult to evaluate, especially given the low base rate of completed suicide. There are fewer frameworks focusing on a specifically OOHC population and none of those focus on suicide prevention (Brown, 2020). Those that have been identified and tested include training foster carers/guardians and case workers to identify risk factors, screening in Accident and Emergency Departments or universal testing of all children in care. Lily Brown completed a review of the options in terms of universal testing and found that many options were not sustainable or feasible, for example, universal screening undertaken by mental health professionals or by the foster carer which relies on a specific and open relationship between carer and child (Brown, 2020). There is a modified approach that could prove effective. By training all case managers in a valid suicide measure which can be administered by non-mental health professionals (i.e. the Columbia-Suicide Severity Rating Scale) and requiring

Table 4.1 *risk factors associated with suicidality in children in OOHC*

Domain	Risk factor	Reference
Individual	Gender	
	Male	(Hamilton et al., 2015)
	Female	(Chavira et al., 2010; Kokkevi et al., 2014)
	Mental illness	(Anderson, 2011; Chavira et al., 2010; Kääriälä & Hiilamo, 2017; McNamara, 2013)
	Disability	(Christoffersen, Poulsen, & Nielsen, 2003)
	Convictions	(Björkenstam, Björkenstam, Ljung, Vinnerljung, & Tuvblad, 2013; Christoffersen et al., 2003)
	Behaviour problems	(Chavira et al., 2010; McNamara, 2013)
	Alcohol & drug misuse	(Hamilton et al., 2015; Kääriälä & Hiilamo, 2017; Kokkevi et al., 2012)
	Older age when entering care	(Hamilton et al., 2015)
Family	Parental mental illness (in both foster and biological parent)	(Christoffersen et al., 2003)
	Abuse and neglect	(Chavira et al., 2010; Christoffersen et al., 2003; McNamara, 2013)
	Mother had a history of child welfare involvement	
	Higher number of placements	(Anderson, 2011; Hamilton et al., 2015)
	Group homes (rather than foster care)	(Hamilton et al., 2015)
Community	Remote/rural location	(McNamara, 2013)
	SES	(Kokkevi et al., 2012)
School/ employment	Unemployment/no graduation/training	(Christoffersen et al., 2003; Hamilton et al., 2015)
Peer	Arguments/relationship breakdowns	(McNamara, 2013)

this to be completed at every regular review with every child, children could be efficiently identified and referred to mental health care (Brown, 2020). Of note is the relatively small cost of training and licensing this measure.

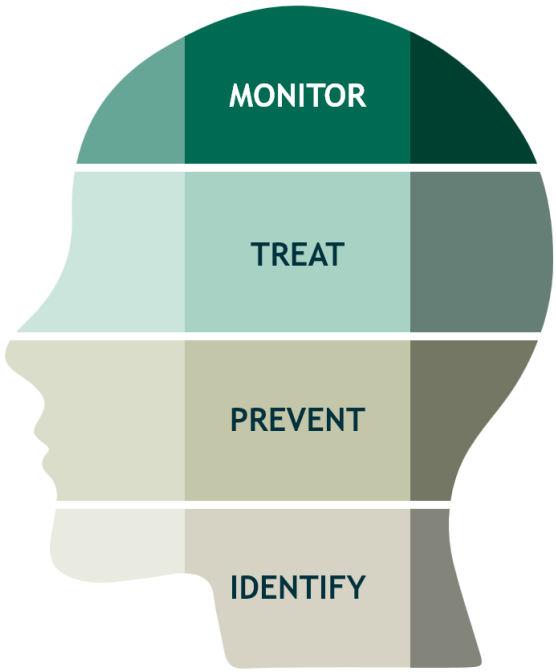
A successful screening protocol that identifies ‘cases’ creates an ethical responsibility to provide an efficient and effective treatment pathway for those identified. Treatments such as cognitive behavioural therapy, problem-solving and group therapy have been effective; as have simple methods such as regular ‘check-ins’ through text or web-messaging (Robinson, 2008). Web-based psychoeducation and guided meditation/mindfulness provided

through apps such as headspace and through foundations such as beyondblue can also be effective, however, rely on sufficient resources (such as phone data or subscription) on the part of the child in OOHC (Brown, 2020; Buys et al., 2011; Evans et al., 2017).

Independent of the presence and availability of effective interventions, OOHC children often have very poor help-seeking behaviour. A study of Swedish high school students found that whilst 36.8% of OOHC students affirmed self-injury only 19.4% sought help.

5

FOUNDATION BIOLOGICAL CONSTRUCTS



5.1 Introduction

i) Genetics including epigenetics

Prior to early this century the central dogma of genetics was a linear process whereby messenger RNA (mRNA) in the cell nucleus reads the DNA code, the mRNA leaves the nucleus and in the body of the cell provides information for the synthesis of protein. Two advances have challenged this theory to the point where it can no longer be sustained.

The first challenge was the finding of gene alleles; genes can have more than one structural form. Gene alleles code for the same underlying biological process – they have the same purpose and are found at the same location on the chromosome. However, different alleles may be copied by mRNA at different 'transcription' speeds. There is evidence that different transcription speeds can result in differential resilience or vulnerability to illness. Further, in a new understanding of pathological processes, an individual's genetic alleles can interact with environmental stimuli to produce different outcomes. In the field of behavioural genetics the most famous study of this type analysed data from a longitudinal study of children in Dunedin, New Zealand and found the relationship between depression and substantiated child abuse was fundamentally moderated by whether you had two short alleles of the serotonin promoter gene or you had two of the long allele forms. The difference in the rate of depression at age 26 years was in the order of threefold (Caspi et al., 2003). This area of research is loosely referred to as the study of 'gene-environment' interactions (G x E).

The second major challenge to existing dogma; to some a genetic revolution that has implications for our understanding of child abuse and neglect, is the area of epigenetics. Advances in this area are the second reason that a linear, factory-style relationship between DNA and protein synthesis is no longer a sustainable concept. Epigenetic theory states that DNA can be manipulated to speed up or slow down the transcription speed and thereby the rate of production of protein. A key concept is that DNA strands form tightly convoluted structural entities called chromatids; these look like beads on a string. The proximity of the DNA in these tight structures makes the DNA code relatively more difficult to copy. A key finding was that proteins associated with these tight DNA structures, histone proteins, can be manipulated by various chemical processes to unravel the structure and make it more easily read. There are thought to be at least nine different chemical processes that can lead to ravelling or unravelling of DNA. The most frequently researched is methylation, the simple process of adding one -CH3 molecule to a point on the histone protein. Unravelling leads to increased transcription speed, the opposite, 'methylation' leads to a slower transcription speed. Seminal work by Michael Meaney and colleagues in Montréal has established in animal models that better parenting leads to unravelled DNA that transcribes more quickly in the offspring. There are now methylation 'heat maps' that demonstrate wide-spread child abuse and neglect-related changes across the genome in terms of methylation. Many of the studies cited in this review are of epigenetic change.

ii) Allostatic load (AL)

The AL concept was introduced in 1993 by McEwen and Stellar and describes a relationship between stress and the development of disease based on allostasis (McEwen, Stellar, 1993). Allostasis refers to the organism's ability to achieve stability (homeostasis) through change. The understanding that healthy functioning requires continuous adjustments of the internal physiological environment is key to the AL concept (McEwen & Wingfield, 2003). Whereas homeostasis focuses on isolated feedback loops, and instant actions to maintain equilibrium in processes that are essential in the short term (e.g., the control of blood pressure), allostasis involves multiple physiological systems as well as the brain and nervous system to control the body's response. The stress response system reacts to environmental pressures by activating the sympathetic nervous system, and the hypothalamic-pituitary-adrenal axis (Miller et al., 2011; Seeman et al., 2010). Activation of this as a response to acute stressors is adaptive, however chronic activation results in a "wear-and-tear" on the body, producing impairment expressed in inflammatory, neuroendocrine and metabolic biomarkers (McEwen, Gianaros, 2011). In support of this, AL has been observed across physiological regulatory systems, including increased levels of HbA1c, total cholesterol, adiposity, and metabolic syndrome (Lehman et al., 2005; Miller et al., 2011; Tamayo et al., 2010).

The definition of AL reflects the cumulative effect of experience in daily life involving both ordinary events as well as major, chronic challenges. When environmental challenges surpass the individual's ability to cope, allostatic overload (AO) ensues. AO is an extreme state where stress response systems are continuously activated and buffering factors are no

longer adequate (Fava et al., 2019). Whereas AL activates different processes and enables the adaption of unexpected situations through several mediators, such as hormones, neurotransmitters, oxidative stress, neurotrophins, and immune-inflammatory markers, AO serves no useful purpose and predisposes the individual to disease (McEwen, 2004; Misiak et al., 2014).

Chronic activation of the pro-immune, and neuroendocrine system (primary mediators) can lead to dysregulation of the cardiovascular, second-order immune, and metabolic systems (secondary outcomes), resulting in an actual disease (tertiary outcome) (figure 5.1) (McEwen, Seeman, 1999).

AL gives the means to account for the systematic pathophysiological effect of cumulative stress exposure in humans (Katz et al., 2012). By combining a range of biomarkers from each biological system and composing these into an AL score (Juster et al., 2011; McEwen, 2015; Seeman et al., 1997), clinicians have a way to assess for the body's "wear-and-tear" and predict a patient's risk for different stress-exacerbated diseases.

iii) Neuroimaging

Physical evidence of abuse has been recognised as long as the phenomena of child abuse. Seminal papers such as the battered baby syndrome (Kempe, 1962) have clarified many of these physical indicators. It is logical that there will be traumatic brain injuries associated with abuse. A more nuanced view is that by impacting the developmental course of a child and considering developmental principles such as "use it or lose it" (an underlying process or indeed anatomical structure may be under-developed if that structure or function is not used a critical developmental stages) there may be evidence of brain changes over time rather than just related to an acute traumatic event. Magnetic resonance imaging (MRI) is a powerful methodology to assess structural brain damage in abused compare to non-abused individuals. Research designs usually wait for individuals to turn 18 years of age to allow for informed consent and then compare brain structures with control groups. This research has been led by Teicher in the US and Tomada in Japan. Several papers have shown significant reductions in, for instance, occipital cortex volume (18% reduction (Tomada et al., 2009)) in sexually abuse girls and changes in pre-frontal cortex in verbally abuse boys (Tomada et al., 2009). This research has also demonstrated critical periods. The work of Andersen et al. (2008) and colleagues has noted reductions in volume in the hippocampus which are more strongly correlated with abuse at the age of four then it is at earlier or later ages (Andersen et al., 2008). This review will review the empirical evidence of studies looking at MRI change. We also look at a more recent technology, Diffusion Tensor Imaging (DTI) that can look at changes in white matter tracks - structures that connect major anatomical regions.

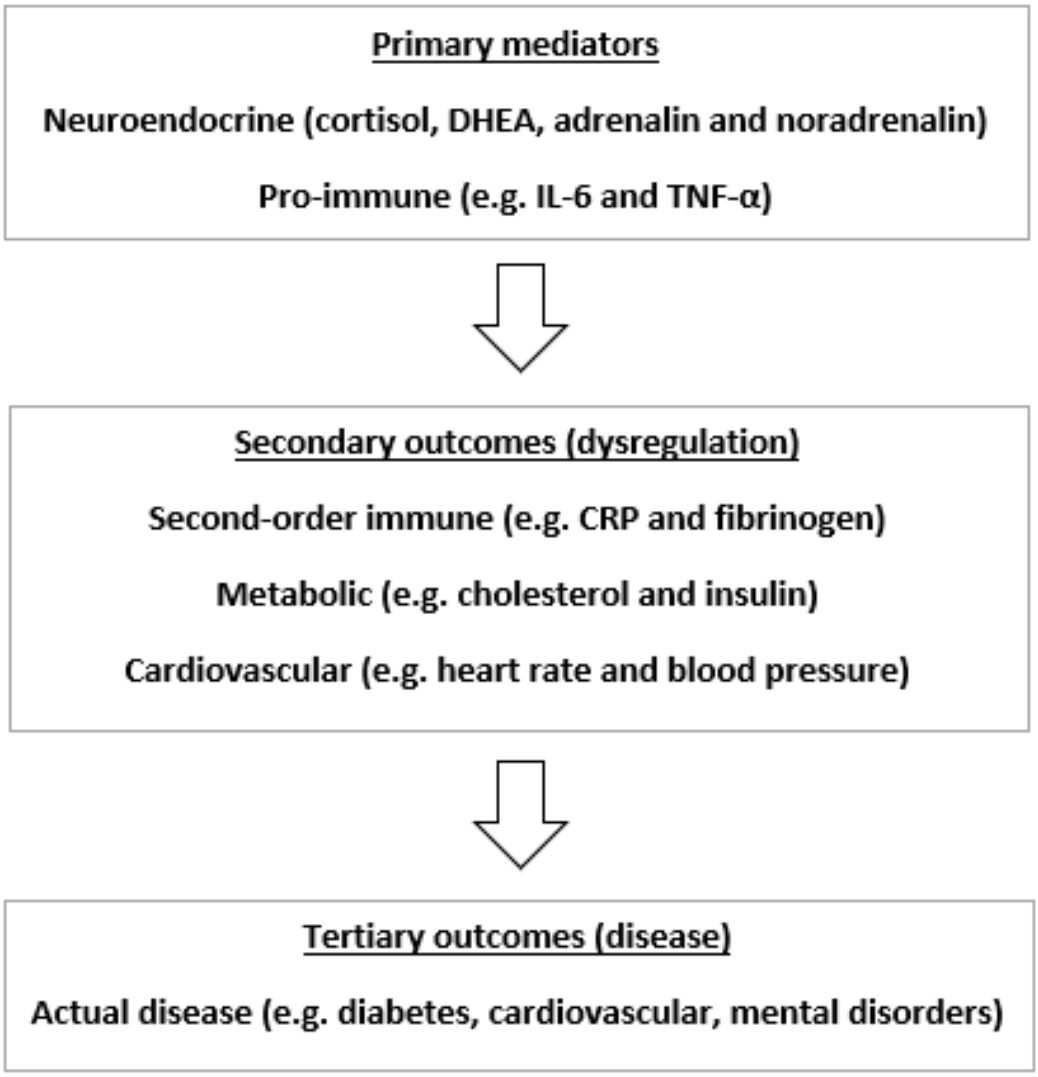


Figure 5.1 *The allostatic load cascade starting with the activation of primary mediators (neuroendocrine and pro-immune), leading to the secondary outcome; dysregulation of the second-order immune, metabolic and cardiovascular systems, leading to tertiary outcome (the actual disease).*

5.2 Adverse childhood experiences and genetic factors

Disadvantaged populations and those subjected to historical trauma across generations show poorer health outcomes across multiple domains. The biological and genetic mechanisms underpinning this have become an area of great interest for researchers. Various biological pathways have been proposed as the cause of this intergenerational trauma effect; with the impacts of both allostatic load and changes to the epigenome taken into consideration (Figure 5.2; Conching et al., 2019).

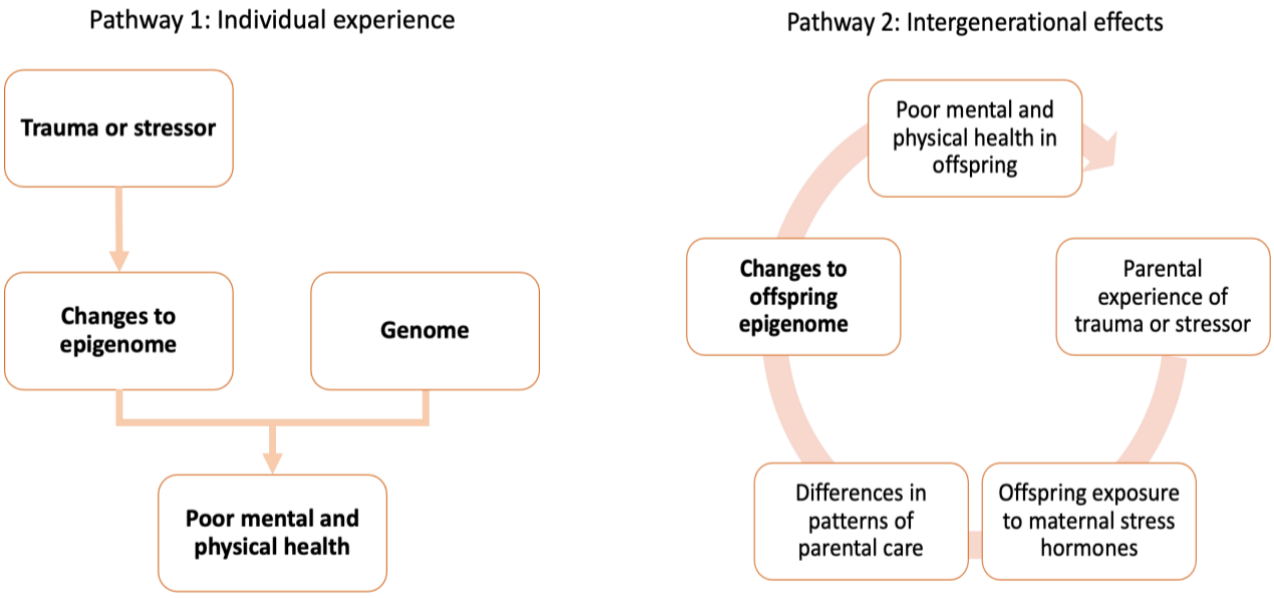


Figure 5.2 *Proposed biological pathways for historical trauma to affect health (reproduced from Conching et al. 2019)*

Described in the more detail in section 5.3, childhood maltreatment is associated with reduced grey matter volume in the orbitofrontal cortex (OFC). There has also been a relationship between childhood maltreatment, reduced grey matter volume and increased DNA methylation of the oxytocin receptor. Oxytocin is often described as the 'love' hormone, as it rises during physical contact and is involved in lactation following childbirth. Increased DNA methylation of the oxytocin receptor was associated with an insecure attachment style which has also been linked to later mental illness and poor outcomes (Fujisawa et al. 2019). Earlier work from Smearman et al., (2016) also found an interaction between oxytocin receptor DNA methylation in predicting psychopathology in those with a history of childhood abuse. Large studies assessing the impact of childhood maltreatment have also identified differential DNA methylation in genes associated with mental health, cancer, cardiovascular disease and immune dysfunction between maltreated and non-maltreated children. Results have indicated an increased risk for adverse physical and mental health outcomes related to earlier onset of maltreatment and male gender (Cicchetti et al., 2016). Epigenetic changes in children exposed to adverse experiences have also been associated with increased body mass index and obesity, indicative of the significant impact early life experiences can have on long term health outcomes (Kaufman et al. 2018). Similar variations have been found in other large-scale studies between children with a history of maltreatment compared to those without (Suderman et al., 2014).

Adverse childhood experiences can be transmitted across generations. Various genes have been implicated in this process and the development of psychopathology including FKBP5. The FKBP5 gene has an important role in the human stress response by, among other functions, modifying glucocorticoid receptor activity. Post-partum women and their newborn infants were assessed for allele-specific epigenetic changes related to adverse

childhood experiences. In infants with the FKBP5 CC genotype, FKBP5 methylation was correlated with maternal ACEs and prenatal PTSD symptom severity providing evidence for allele-specific epigenetic signatures (Grasso et al. 2020). The FKBP5 gene was also associated with childhood trauma and worse cognition in patients with schizophrenia (Green et al., 2015). Similar findings were present for the catechol-O-methyltransferase (COMT) gene; an important gene in neurotransmission including breaking down Dopamine. Methylation of the COMT allele Val(158)Met polymorphism in patients with schizophrenia/ schizoaffective disorder and childhood abuse was associated with worse cognition (Green et al. 2014). Lower levels of brain-derived neurotrophic factor (BDNF) are associated with both childhood trauma and bipolar disorder. The serotonin promoter transporter genotype has been shown to influence the relationship between levels of BDNF and early life trauma, with early life trauma being associated with lower BDNF levels in patients with bipolar affective disorder. This in turn could be linked to epigenetic modulation of BDNF gene expression in this cohort (Benedetti et al., 2017). Hecker et al. (2016) found that high exposure to child abuse was associated with more mental health problems and differential DNA methylation of the proopiomelanocortin gene. This gene is responsible for producing hormones in the anterior pituitary including adrenocorticotropic hormone, which regulates the secretion of stress hormones from the adrenal cortex and thus the stress response.

Changes in the levels of neurotransmitter serotonin have been implicated in the psychopathology of depression, anxiety and other mental illness. Epigenetic modification of the serotonin 3A receptor as a result of childhood maltreatment has been associated with increased severity of bipolar affective disorder, Borderline Personality Disorder (BPD) and adult ADHD (Perroud et al., 2016). Similarly, a genome wide methylation scan of subjects with BPD found an association between several genes implicated in BPD and the severity of childhood maltreatment (Prados et al., 2015). Furthermore, among patients with comorbid bulimia nervosa and BPD, there was increased methylation of the dopamine inducing gene DRD2 (Groleau et al., 2014). DNA methylation changes and subsequent changes in gene transcription associated with child abuse could also be linked to alcohol and cannabis dependence in specific populations (Zhang et al., 2013; Carey et al., 2015).

Children exposed to different types of abuse have also been shown to have different epigenetic changes. Childhood sexual abuse was associated with the endocannabinoid gene MGLL, indicating a possible relationship with cannabis dependence (Carey et al. 2015). There were higher mean levels of leukocyte NR3C1 DNA methylation in women who reported childhood physical and sexual abuse compared to non-abused women, and this was proportional to the degree of abuse. Interestingly, receiving emotional support in childhood appeared to reduce DNA methylation in those exposed to severe physical and sexual abuse (Shields et al. 2016).

Cecil et al. (2016) found that maltreatment types differed in the extent to which they influence DNA methylation. Children exposed to physical abuse had the strongest association with methylomic variation and many of the identified genes had previously been

implicated in stress-related outcomes for physical and psychiatric disorders. Similarly, in patients with a history of physical abuse and concurrent schizophrenia, positive symptoms were greater in COMT Val(158)Met carriers compared to those who experienced emotional neglect where negative symptoms were greater (Green et al., 2014). Exposure to childhood adversity and indirect exposure to neighbourhood violence has been associated with reduced DNA methylation of the IL-6 promotor gene and greater stress induced IL-6 levels. Higher IL-6 levels in the advent of stress were also associated with a blunted cortisol response (Janusek et al., 2017). A 'blunted' response is likely to be related to poor impulse control because of decreased responsiveness to reward and reward-related modification. This highlights the complex neurobiological systems involved in the development of mental illness and the impact of ACEs.

Despite the body of evidence presented, further research in this area is still required to elucidate the genetic and epigenetic changes that contribute to poorer mental health outcomes in children who experience early life adversity. Current research findings must also be interpreted with the knowledge that epigenetic changes only represent one piece of the puzzle, with a complex interplay between various biological systems contributing to physical and mental health outcomes in those exposed to early life adversity. Given epigenetic mechanisms are more dynamic than differences in gene allele structure, these mechanisms may also be modifiable by socioeconomic, therapeutic or other interventions to create more positive outcomes.

5.3 Adverse Childhood Experiences and Allostatic Load

There is increasing evidence of how repeated toxic stress and adverse experiences can cause permanent damage to the developing brain and change the functioning of the neurological, immune, and endocrine systems in exposed individuals. This in turn increases their risk of developing chronic diseases and early death (Boullier, Blair, 2018). The impact on physical and mental health have been reported as early as six years of age, with exposure to one ACE doubling the likelihood of poorer health outcomes (Khandaker et al., 2014; Monnat, Chandler, 2015). Children with exposure to four or more ACEs had almost three times the risk of poor health in comparison to those with no ACEs (Centers for Disease Control and Prevention, 2021).

As the negative impacts of ACEs on health in adults are increasingly recognised, explorations of mechanisms underlying these relations are starting to emerge (Wallace et al., 2020). Faster biological aging as a result of prolonged and cumulative exposure to chronic, toxic stress could explain the earlier onset of age-related chronic diseases (McEwen, 1998). A biological measure that has been linked to chronic or cumulative exposure to stress across the course of life is AL, discussed above.

In the past few decades, AL has been providing researchers with a useful framework to study both the protective effect of stress mediators during acute stress exposure and the

damaging effects of chronic, toxic stress (McEwen, 2005). AL has been applied to aging (Seeman et al., 1997), socioeconomic inequalities (Seeman et al., 2014), and mental disorders (Berger et al., 2018; Misiak et al., 2014). However, the concept could also be used to better understand the consequences of ACEs. Using AL to study the long-term consequences of stress in childhood focuses attention on the biological changes resulting from the adverse psychosocial experiences in children and the continuous wear-and-tear of the body, which develops in the longer term as a failed attempt to adapt (Danese & McEwen, 2012).

i) Child development, adverse childhood experiences, and allostatic load

Early neglectful or abusive family relationships may affect the development of behavioral, social, emotional, and biological mechanisms that challenge a child's ability to regulate stress and is thought to lead to long-term adverse physical health outcomes (Boullier, Blair, 2018; Danese, McEwen, 2012). Stressors experienced in sensitive developmental periods during childhood can have enduring influences on the AL, both through childhood and later life. Elevated blood pressure, accelerated cellular aging, and increases in proinflammatory immune system programming have been observed in adults who reported ACEs (Carroll et al., 2011), but importantly, they are also reported in the children that are currently experiencing ACEs (Drury et al., 2012; Evans, 2003; Miller, Chen, 2010). This indicates an overlap between the chronic consequences of elevated AL and ACEs, and that biological processes involved in AL may underlie the pathophysiology of ACEs. The biological changes in children also include changes to the volume of key areas of the brain including a smaller pre-frontal cortex, a larger amygdala, and a smaller hippocampus (only in adulthood) (Danese, McEwen, 2012). Furthermore, ACEs change the maturation and responsiveness of the allostatic systems and thereby exert long-term effects on health (Danese, McEwen, 2012; Hertzman, 1999).

The endocrine, nervous and immune systems are not fully matured at birth and display significant changes during childhood. For example, the brain is experiencing significant age-related changes until young adulthood (Giedd, Rapoport, 2010) and chronic stress in early life may interfere with the development of the stress response system (Ganzel et al., 2010; McEwen, 2012) and an impairment to the ability to adapt and cope with demanding circumstances later in life (Compas, 2006; Shonkoff et al., 2012). Similarly, the immune system undergoes age-dependent maturation after birth, which includes both the innate and adaptive immune systems (Adkins et al., 2004). Newborns are protected through passive immunity against infection by maternal antibodies in breast milk, and their adaption to infections relies on the activity of their innate immune system (Levy, 2007). During early development, microorganisms (on the skin and in the gastrointestinal tract) activate T- and B-cells of the acquired immune system (Adkins et al., 2004). Consistent with all adaptive functions, experience-dependent information can greatly modify the maturation of allostatic systems. The degree to how children are exposed to social stimulation has an influence on their predisposition to social functioning (i.e. communication) at an older age

(Rutter et al., 2007). Similarly, the extent of infection in childhood influences their predisposition to allergies and autoimmune reactions in later life (Bach, 2002).

Just like positive experience-dependent information, psychosocial ACEs might change the maturation of allostatic systems to promote adaption. Similar to psychosocial adversities in adults, ACEs are likely to signal high levels of environmental threat and thereby trigger adaptive responses in the endocrine, immune, and nervous systems in children (allostasis) (Danese, McEwen, 2012). Unlike psychosocial adversities experienced in adult life, ACEs may result in responses that endure long after the initial threat has finished, thus becoming harmful (i.e., Allostatic Overload). AL may therefore be a mediator of the long-term effect of ACEs on psychiatric disorders, such as PTSD, depression, anxiety, and substance use (Danese et al., 2009; Felitti et al., 1998; Nanni et al., 2012; Stern, Thayer, 2019) as well as physical health issues; cardiovascular disease, cancer, lung disease, and other major causes of premature deaths (Danese et al., 2009; Felitti et al., 1998; Repetti et al., 2002). By combining a range of biological risk factors into an AL score which represents a chronic, multi-system dysregulation, clinicians have a way to assess and follow an individual's risk for physiological and mental diseases as a result of chronic, toxic stress.

ii) Allostatic load in children and adolescents

The connection between ACEs and long-term harm has been demonstrated clearly in the ACE study, which was conducted by the Centers for Disease Control and Prevention (CDC) in the United States between 1995-1997 (Centers for Disease Control and Prevention, 2020). This was a large epidemiologic study of over 17,000 children followed from birth into middle adulthood. It investigated childhood abuse (emotional, physical, and sexual), neglect (emotional and physical), and household challenges (domestic violence, substance abuse, mental illness, parental separation, and incarceration) and compared these to later-life health and well-being. It demonstrated a correlation between increased numbers of ACEs, and the risk for serious psychiatric and physical health problems in adulthood (Anda et al., 2006). This is supported by the findings from a longitudinal study of more than 10,000 children in the United Kingdom, which also demonstrated a correlation between ACEs in childhood and increased mortality risk in adulthood (Jokela et al., 2009).

A study by Evans (2003) investigated the AL in rural elementary school children and found that increased cumulative-risk exposure, which included physical factors (crowding and noise), psychosocial factors (child separation, violence, and turmoil), and the home environment (single parenthood, poverty, and low-education status for parents), was associated with higher AL scores . The children were followed into adolescence and the effect of the increased cumulative risk on AL persisted. A follow-up study was conducted on the same participants when they reached adulthood . The study looked at the cumulative risk of AL in adulthood as a result of maternal responsiveness in childhood. The cumulative risk of AL was only elevated in young adults when maternal responsiveness was low. It suggests that enhancement of the relationship between parent and child can impact the AL both positively and negatively (Evans et al., 2007).

Danese et al. (2009) demonstrated that exposure to ACEs such as low socioeconomic status, maltreatment, and social isolation within the first decade of life, was associated with increased levels of C-reactive protein (CRP), an inflammatory marker, and clusters of metabolic markers at the age of 32. Other retrospective studies also showed an increase in inflammatory markers following ACEs (especially maltreatment) in childhood (Kiecolt-Glaser et al., 2011; Slopen et al., 2010; Surtees et al., 2003). Evans and colleagues propose that ACEs affect physiological functioning and accumulation of psychosocial risks in childhood as shown in AL levels as soon as at age 9, as well as throughout adolescence (Doan et al., 2014; Evans, 2003; Evans et al., 2007).

Berg et al. (2017) investigated the link between exposure to early life stressors and AL in adulthood using theoretical models. Firstly, the results indicated that stress in childhood and adolescence contributed to elevated AL in adulthood, regardless of economic hardship. Secondly, exposure to economic hardship in adulthood was not related to AL despite childhood and adolescent stressors, neither did it act as a mediating mechanism. Additionally, a cumulative stress measurement combining childhood, adolescent and adulthood stress did not provide a better prediction of AL than the childhood and adolescent measure alone. Thirdly, the findings did not support the occurrence of romantic relationships and positive experiences in adulthood buffering respondents from their experiences of ACEs. On the contrary, the stressors experienced in childhood and adolescence dampened the extent to which a positive experience in adulthood reduced AL (Berg et al., 2017).

Tomasdottir et al. (2015) found an association between childhood difficulties and disease burden in adulthood, linking chronic toxic stress to comorbidities later in life. This association between adversities in childhood and the prediction of adult health was investigated in a large community sample of adults (Turner et al., 2016). Embedding (i.e. the process by which early life experiences affect biological processes in a way that has an impact on long-term health outcomes) during childhood can effect health later in life by limiting or influencing adult social and economic achievement; impacting one's capability to gain and maintain social support and effectively cope with or avoid social stressors. Turner et al. (2016) highlighted that the biological embedding of ACEs cannot be discounted and there is a clear association between the measurement of ACEs and the prediction of adult health. However, the authors state that interventions during childhood could essentially prevent some problematic health outcomes later in life and changes in social experiences and/or context might influence the AL.

iii) Early attachment and parental affection in childhood and allostatic load

A study looking into the importance of early attachment in determining vulnerability to elevated AL investigated the relationship between AL and secure versus insecure attachment in 132 mothers and infants (Hill-Soderlund et al., 2008). The infants that were classified as insecure-avoidant showed physiological distress to separation and reunion, measured by sympathetic and parasympathetic responses. Mothers of securely attached

infants presented the greatest physiological changes during their reunion episode, which indicates the significance of very early attachment relationships have on determining physiologic responses to psychosocial stress. The physiological distress showed by the insecure-avoidant infants indicates that they are more at risk for psychopathology in comparison to the secure infants. Another study demonstrated that parental warmth, shown as love and affection, showed a protective effect from abuse on AL (Carroll et al., 2013). It supports the hypothesis that parental affection acts as a protective factor, against the harmful effects of toxic stress in childhood on health. Interestingly, this raises the possibility of whether a target intervention could potentially improve long-term health issues of children with ACEs when they reach later life.

iv) Poverty / low socioeconomic status and allostatic load

Evans and Kim (2012) investigated if childhood poverty (from birth to age 9) could predict elevated AL in 17-year-olds. Poverty is linked to increased childhood morbidity (Chen et al., 2002) and elevated morbidity and mortality in later life (Cohen et al., 2010; Shonkoff et al., 2009). Health inequalities could be due to elevated stress in low-socioeconomic status (SES) children (Matthews, Gallo, 2011; Shonkoff et al., 2009). Comparing low- to middle-SES children, low-SES children are more likely to have elevated blood pressure (Chen et al., 2002) and increased levels of neuroendocrine stress hormones, which may interfere with the normal development of endocrine, immune and cardiovascular systems (Cohen et al., 2010). The association between poverty as a contributing factor in the accumulation of ACE and AL was suggested as exposure to childhood poverty leads to elevated AL later in life, indicating a pervasive and long-term effect (Evans, Kim, 2012). This supports the notion that increased chronic stress induced by poverty is harmful to human development in the long term, which was supported by Evans and Schamberg (2009). The association between childhood poverty, resulting in chronic stress, and impaired working memory as a young adult (mediated by elevated AL) was also suggested by Evans and Fuller-Rowell (2013). Interestingly, they found that children with greater self-regulatory abilities were to some extent protected from the harmful effect of stress on their working memory. Another study investigated the impact of SES in childhood on the AL in adulthood (Dich et al., 2015) and found that SES in childhood was associated with physiological dysfunction in later life for men, but not for women. The strongest effect of SES was observed in the inflammatory markers and the measures of blood glucose and abdominal adiposity, which was likewise shown by Surtees et al. (2003) and Danese et al. (2009). In summary, poverty and low SES in childhood is associated with elevated AL in adulthood. This association may reflect both higher levels of cumulative risk exposure as well as diminished coping resources (Wadsworth, Berger, 2006).

v) Childhood discrimination and allostatic load in adulthood

Racism is widely recognised as a fundamental determinant of health for stigmatised groups (Berger, Sarnyai, 2015). Ethnic minority groups suffer from lower access to health services, a higher burden of diseases, and lower life expectancy (Kung et al., 2008). Growing evidence

suggests a strong link between discrimination and adverse health outcomes, which seem consistent across populations (Berger, Sarnyai, 2015). Limited information about the impact of childhood racial discrimination on adult health is currently available. Some evidence has linked child discrimination to changes in stress biology with significant cortisol changes (Adam et al., 2015). Brody et al. (2014) found discrimination experienced in the teens of African-Americans was associated with AL at age 20, and Ong et al. (2017) found an association between racial discrimination of African-Americans and elevated AL in middle adulthood. These findings are consistent with mentioned conclusions suggesting the cumulative impact of ACEs over time results in chronic elevated AL. Currie et al. (2019) extended on these findings, by investigating 7 different biomarkers, in children of First Nations people in Canada finding that frequent discrimination would produce a higher AL in young and middle adulthood. Research on AL in Australian Indigenous children is urgently needed.

vi) Adverse childhood experiences, allostatic load, and health risk behaviours

Health risk behaviors, including smoking, alcohol and drug use, physical inactivity, poor eating and sleeping patterns, are associated with elevated AL (Suvarna et al., 2020). A large study showed a significant association between ACEs and AL at the age of 44 (Solís et al., 2015). The main theory tested in the study was that chronic stress resulting from ACEs may be biologically embedded and leading to multi-system dysfunction through three intertwined pathways across the course of an individual's life: an indirect health behavior pathway, an indirect socioeconomic and/or psychosocial pathway, or through a direct pathway from alterations of physiological stress systems, that may influence health in the long term. They found that ACEs were related to elevated AL at 44 years old and that the association was strongly mediated by health behaviors (smoking) and socioeconomic status (education and wealth). Doan et al. (2014) also investigated the effect of ACEs on health risk behaviours and found individuals who had experienced an ACE to be more likely to smoke cigarettes and use substances. ACEs were linked to elevated AL in adulthood and health risk behaviours at age 17. Health risk behaviors at age 17 were also found to elevate AL. Many adolescences use substances in an attempt to cope with stress (Newcomb & Harlow, 1986). Once addictive behaviors are initiated, stress amplifies these behaviors (Schwabe et al., 2011). Particularly, smoking and alcohol have been linked as a likely candidate for a mediator between poverty-related stress and AL. The result of the study by Doan et al. (2014) showed that the accumulation of demographic, environmental, and psychosocial risk at age 9 predicted the increase in AL, at age 17 years old, independent of initial AL levels. Furthermore, the results showed that elevation of AL was consistent from childhood until adolescence (Doan et al., 2014). In summary, ACEs have a long-time effect on AL in adolescence, and the effect is mediated by health risk behaviors, especially smoking and alcohol use.

vii) Adverse childhood experiences, allostatic load, and depression in adulthood

Despite the broadness of literature covering the association between depression and AL (Honkalampi et al., 2021; McClain et al., 2021; O'Shields, Gibbs, 2021), very few studies have evaluated how ACEs may affect this relationship. The paucity of such data is even more significant given that AL is already elevated in children as young as 8 years of age, and there is evidence of a relationship between ACEs and other mental health diagnosis. For example, AL may mediate the relationship between ACE and psychosis in adulthood (Horan & Widom, 2015; Piotrowski et al., 2020). Scheuer et al. (2018) used the AL framework to investigate childhood maltreatment and later depression. Using a case-control study with 324 individuals from a psychiatric hospital experiencing moderate to severe depression and comparing these to 261 controls, a mediation analysis between ACEs, AL, and depression was conducted. Using 12 biomarkers covering the four systems, the AL model mediated the role between physical abuse and depression. Widom et al. (2015) had similar findings, reporting that individuals with a history of abuse and neglect had increased levels of AL compared to individuals with no history of abuse. A recent study expanded on the model used by Scheuer et al. (2018) but using data from the Midlife Development in the United States study (MIDUS). O'Shields and Gibbs (2021) studied a community sample of 691 individuals, using questionnaires for childhood trauma and measuring 16 biomarkers. The results did not support the mediation findings from Scheuer et al. (2018), however, it supported a connection between maltreatment in childhood and depression in adulthood. Consistent with the vulnerability model (McEwen, 2000), these findings highlight the importance of AL as a mediator between ACEs and adult depression. Though traumatic childhood experiences cannot be reversed, the AL concept might provide a useful tool to identify individuals who are at particularly high risk for depression after having experienced ACEs. Knowing an individual's AL index, may help decrease the incidence of adult depression through early and suitable interventions (Scheuer et al., 2018).

viii) Early interventions

Understanding the significant role that chronic stress and resulting AL play in mediating the lifelong consequences of ACEs highlights the opportunities for early intervention. Although prevention and eliminations of ACEs would account as the most effective method, this is not always an option, so efforts should be made to advance the capacity of caregivers and communities to encourage stable, safe, and nurturing relationships that can assist in switching off the child's stress response to adversity (Garner et al., 2012).

5.4 Adverse childhood events and neuroanatomical changes

i) Structural Brain changes – grey matter

ACEs are associated with structural and functional changes in the brain which have been further quantified with the advancements in neuroimaging in recent years. Structural MRI scans of 623 youth demonstrated that SES alone can predict cortical and subcortical morphology. Lower SES was associated with changes across numerous brain regions with

varying functions including executive planning and decision making (reduced prefrontal cortex and anterior cingulate), processing sensory input (lateral temporal-multiple sensory modalities; superior parietal cortices-visual input), relay and amplifying cortical connectivity (ventrolateral thalamic) and learning and emotional aspects of memory (medial amygdalo-hippocampal area). In addition, those from lower SES had an associated lower IQ (McDermott et al., 2019).

When specifically investigating youth exposed to childhood abuse compared to age- and gender-matched controls, there was an association between history of abuse and widespread structural abnormalities with most brain areas implicated: OFC, cerebellar, occipital, parietal and temporal brain regions (Tozzi et al., 2020; Lim et al., 2018). This is consistent with adults with a diagnosis of major depressive disorder and higher Childhood Trauma Questionnaire scores who were found to have reduced frontal pole cortex, left inferior parietal cortex and right superior parietal cortex thickness when assessed with MRI (Jaworska et al., 2014). Further studies have also identified reduced grey matter volume in the medial OFC and left temporal gyrus, which are involved in emotional regulation, impulse control and memory. For children exposed to maltreatment, these processes are often impaired resulting in risk taking behaviours and later psychopathology (De Brito et al., 2013).

A meta-analysis assessing grey matter volume across twelve data sets in subjects exposed to childhood maltreatment compared to control subjects confirmed changes in the ventrolateral prefrontal-limbic-temporal regions. These regions are typically involved in affect and cognitive control, which can be impaired in children with a history of maltreatment (Lim et al., 2014).

There is some evidence of differentiation of damage to brain region by type of abuse and by the timing of abuse (Akemi et al., 2005). There is evidence to show that institutionally reared children exposed to early-life neglect are at an increased risk of developing depression, anxiety and other internalising disorders. MRIs from 69 institutionally reared children involved in a randomised clinical trial of foster care showed neglect-associated changes in the external capsule and corpus callosum in middle childhood and early adolescence. This indicates potential alterations in neurological development involved in emotional regulation for children in care (Bick et al., 2015). Similarly, in patients with schizophrenia, emotional neglect in childhood was predictive of grey matter density in the dorsolateral prefrontal cortex, which was predictive of the degree of disorganisation. Higher levels of emotional neglect were also associated with reduced total grey matter volume in these patients (Cancel et al., 2015).

Childhood sexual abuse has also been shown to alter brain morphology using MRI with grey matter volume reduced by 12.6% and 18.1% in right and left primary visual and visual association cortices in those with a history of abuse. Duration of childhood sexual abuse before the age of 12 was directly related to the degree of grey matter loss indicative of the importance of early visual experiences in neurological development (Tomoda et al., 2009).

Adults with PTSD related to childhood physical and sexual abuse were found to have a 12% reduction in left hippocampal volume compared to matched control subjects (Bremner et al., 1997). Similarly, in patients with a psychotic disorder, severity of childhood sexual abuse was predictive of lower total grey matter volume (Sheffield et al., 2013). As is expected in any area of science not all findings are consistent. Rinne-Albers and colleagues (2020) found no significant difference between cortical thickness, surface area or volume of the ventromedial prefrontal cortex, insula and middle/superior temporal gyrus of adolescents with a history of childhood sexual abuse resulting in PTSD compared to healthy controls.

Exposure to adverse childhood experiences has also been implicated in differing types of psychopathology. Studies have shown that patients with obsessive-compulsive disorder (OCD) have increased volume and metabolism of the caudate nucleus. Consequently, an MRI study looking at 40 patients with OCD found those with higher ACE scores had increased grey matter volume of the left caudate nucleus, earlier age of onset and required drug treatment in addition to psychological therapies. Interestingly, long term treatment with medication was associated with reduced volume of the caudate nucleus (Benedetti et al., 2012).

ii) Structural Brain changes – white matter

A new area of brain imaging research investigates changes in white matter rather than the original focus on neurones and other 'grey matter'. Investigating white matter seeks to understand connections between areas. DTI has shown an association between reactive attachment disorder and the anatomical areas involved in emotional regulation, namely the corpus collosum and projection, and thalamic pathways (Makita et al., 2020). Childhood maltreatment can also result in dissociative experiences and functional neurological disorders. Using DTI, Yamada and colleagues (2019) found decreased diffusion characteristics within multiple brain regions over the frontoparietal and temporal areas. The white matter structures affected correlated with clinical and behavioural symptomatology. A small study comparing youth exposed to childhood abuse, psychiatric controls and healthy controls found abuse-specific reduced tract volume in the inferior longitudinal fasciculus and inferior frontal-occipital fasciculus. Lim and colleagues suggest these neural pathways may be involved in processing adverse experiences such as childhood abuse (Lim et al. 2019). Furthermore, DeRosse and colleagues (2020) found that 6% of variance in the accumbofrontal neural tract assessed with DTI (integral in 'reward' processes) was accounted for by the degree of childhood trauma as per the Childhood Trauma Questionnaire. Likewise, childhood trauma has been associated with significant reductions in global white matter connectivity, which was subsequently associated with placement instability (for those in institutional care), attenuated cortisol secretion and higher levels of internalising and externalising behaviours (Puetz et al., 2017).

Similar to the discussion related to grey matter, there have been differences noted between white matter tracts based on the type of trauma experienced. A prospective DTI study that followed up the institutionally reared children studied by Bick and colleagues at 6-month

intervals found that adolescents exposed to childhood maltreatment and who subsequently developed major depressive disorder or substance use disorder were found to have white matter disruptions (Huang et al., 2012). Early neglect, as is often seen in children in institutional care, was associated with pre-frontal cortex white matter alterations and neurocognitive decline (Hanson et al., 2013). Similarly, patients with minimally treated first episode schizophrenia (FES) who had a history of childhood emotional neglect had altered cortical limbic circuitry compared to control subjects. A difference was also noted between the white matter pathways of patients who experienced childhood emotional neglect compared with childhood sexual abuse (Asmal et al., 2019).

In FES patients with a history of childhood sexual abuse, Asmal et al. found significantly lower fractional anisotropy (FA) in the inferior fronto-occipital fasciculus, inferior longitudinal fasciculus, superior longitudinal fasciculus and forceps major (stress related white matter pathways). By comparison, patients with a history of emotional neglect from the same study had higher FA in the right superior longitudinal fasciculus. Adolescents with PTSD resulting from childhood sexual abuse had significantly lower FA in the genu, midbody and splenium of the corpus callosum compared to age matched healthy controls, a structure responsible for ensuring the left and right hemispheres of the brain communicate sensory, motor and cognitive information. Higher levels of anger as per the Trauma Symptom Checklist for Children were associated with abnormalities in the body of the corpus callosum (Rinne-Albers et al., 2015).

Physical abuse has also been found to affect neurological development and emotional regulation in children. Hanson et al. (2010) used MRI to demonstrate a significant reduction in the right OFC, in addition to an overall reduction in brain volume for children exposed to physical abuse. Reduced OFC volume was also predictive of increased family stressors, academic problems and school related stress. This demonstrates some of the neuroanatomical changes that may result in response to different adverse childhood events, and subsequently, their ability to respond to future stressors.

Studies have also addressed the additive effects of adverse childhood events and other psychopathology. Park et al. found increased white matter connectivity in children with ADHD and a history of traumatic events compared to children with ADHD alone. Structures affected included the corpus callosum and cingulate gyrus, both involved in processing emotions and behaviour regulation. These differences were not identified in community matched controls, indicating there may be a susceptibility to trauma related insults in children with ADHD.

iii) Functional Brain changes

Functional MRI determines the level of brain activity by detecting changes associated with blood flow given cerebral blood flow and neuronal activity are coupled. Bruce and colleagues proposed that given children in institutional care are often exposed to multiple ACEs, these experiences may affect inhibitory neural pathways. Functional MRI was used to

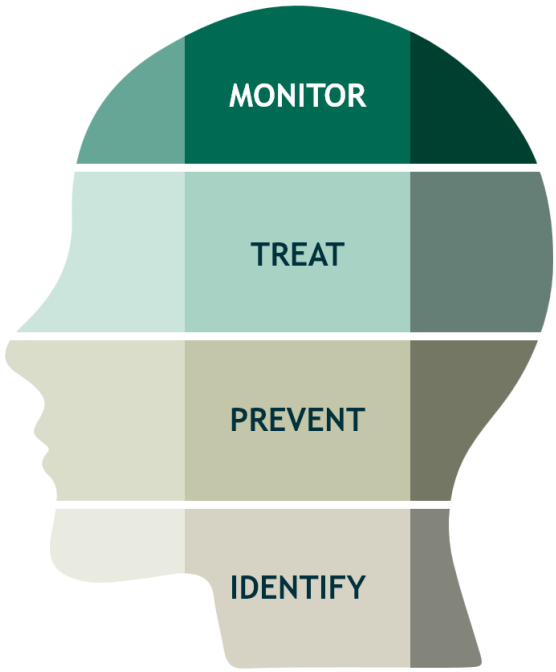
assess performance during a go/ no-go task in a group of maltreated foster children in institutional care versus non maltreated children living with their parents. Foster children showed stronger activation in the inferior parietal lobule and right superior occipital cortex during incorrect no-go trials, thus providing preliminary evidence of impaired inhibitory control in corresponding neural regions (Bruce et al., 2013). This was consistent with a sample of young adults; those who reported higher levels of maltreatment on the Childhood Trauma Questionnaire also scored higher on the Impulsive Behaviour Scale and had reduced neural responses during a working memory task (Hallowell et al., 2019). There was also a significant relationship between neural activity, history of childhood maltreatment and impulsivity (Hallowell et al. 2019). In line with this, when patients with BPD completed a functional MRI emotional face processing task, there was a reduction in amygdala habituation to repeated negative stimuli compared to healthy controls. Increased exposure to childhood maltreatment was also significantly associated with reduced amygdala habituation. The amygdala is the fear processing centre of the brain and patients with BPD often have heightened responses to perceived threats and increased impulsivity (Bilek et al., 2019). Enhanced fear responses (behavioural and neurological) and impaired inhibitory neural pathways in those exposed to ACE have also been shown in other research studies (Hart et al., 2018; Herringa et al., 2013; Lim et al., 2015). Increased amygdala activation has also been associated with earlier age of abuse onset (McCrory et al., 2013).

Enhanced fear responses have also been associated with caregiver deprivation and emotional neglect. Maheu et al. found that adolescents with a history of emotional neglect had significantly higher left amygdala and hippocampal activation when processing threatening information. Similarly, higher levels of emotional neglect were found to be associated with blunted development of reward-related ventral striatum activity over a 2-year period, with an initial age range of 11 to 15 on first assessment. This was subsequently found to relate to greater depressive symptoms, which were more prominent in those with a history of emotional neglect (Hanson et al., 2015).

An emerging research area is linking genetic findings with brain imaging. When challenged with tasks requiring progressively increasing degrees of sustained attention, adolescents exposed to childhood abuse made more omission errors compared to control subjects. Functional connectivity was also concurrently assessed, with participants exposed to childhood abuse demonstrating reduced connectivity and a left-hemispheric bias in fronto-parietal attention pathways. Participants who were homozygous for the C-allele of the single nucleotide polymorphism rs3800373 of the FK506 Binding Protein 5 gene and who were subjected to childhood abuse also had more severe connectivity abnormalities (Hart et al., 2017).

6

RESPONDING TO CHILDRENS NEEDS: MAKING SENSE OF COMPLEXITY



6.1 The 'Omnibus' Model

The omnibus model (omnibus – 'relating to many things') is a construct which helps to bring together the multiple factors implicated in the development of a complex and severe child or adolescent mental health presentation.

The model highlights that the actual presenting symptom, in the example in Figure 6.1 feelings of dysphoria, has distal risk factors that may have been operant many years before. These are divided into individual factors and family factors. There are also risk factors in the form of normal developmental challenges such as entering high school or negotiating new more complex adolescent relationships. These are called normal crises. Abnormal crises refer to ACEs such as being a victim of verbal, physical or sexual abuse, or neglect. Note that downstream of the presenting symptom some responses can be helpful, such as talking to parents, a counsellor or engaging in an activity that has therapeutic benefit. Some downstream behaviours are clearly problematic such as dealing with dysphoria by engaging in DSH or self-medication with alcohol and/or drugs. It is also important to acknowledge that every individual is different and for some individuals, and indeed for some presenting conditions there may be more influential family factors. For other conditions individual

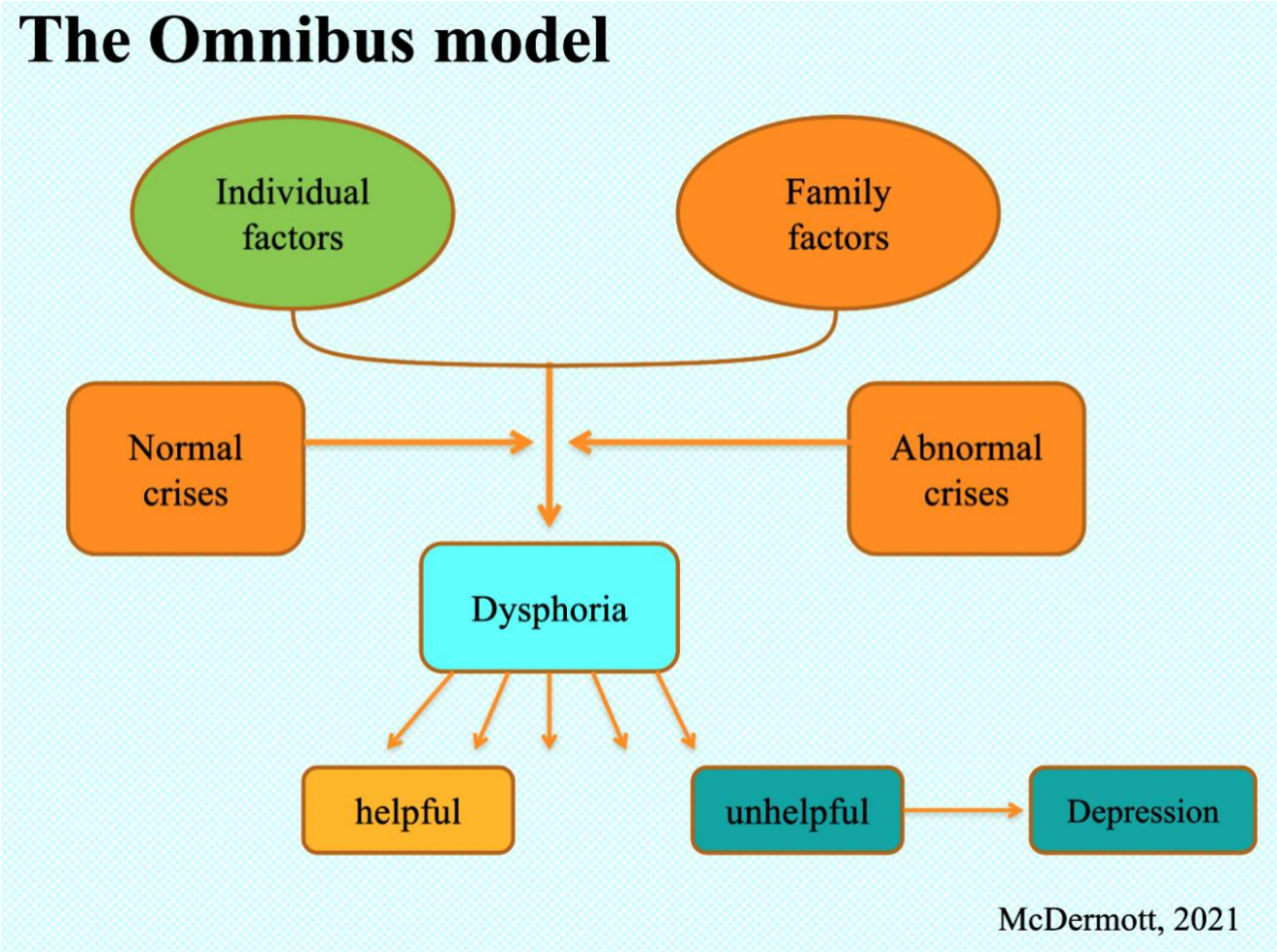


Figure 6.1

factors are more influential. A formulation based on the omnibus model helps the clinician to be eclectic. Every case has numerous important inputs. This understanding of a complex presentation broadens the therapeutic response to potentially include family work, individual therapy, dealing with the specific effects of experienced trauma, promoting helpful reactions and extinguishing unhelpful responses.

Using the omnibus model as a vehicle to summarise the new research highlighted in previous chapters of this report, the major contributors to elements in the model are:

Individual factors

- Presence of an at-risk gene alleles such as 2 x S forms of the serotonin promoter gene,
- Abuse related epigenetic change (e.g., methylation) of multiple genes, probably the most influential being involving the stress response, neurotransmitter and neuroinflammatory systems,
- Dysregulation of the normal physiological homeostasis in the body (AL), most affecting the stress response and inflammatory systems

- Insecure or avoidant attachment
- Poor self-esteem, poor sense of efficacy and unhelpful coping mechanisms.

Family factors

- Parent separation leading to maternal stress,
- Poverty and the consequences of poverty (e.g., housing and food instability),
- Exposure to domestic violence and antisocial behaviour,
- Parent mental health disorders,
- Parents response to their own trauma experience including dys-regulated emotions and behaviour, and inconsistent and/or coercive parenting

Normal 'crises'

Consistent with any individuals' developmental path there is the requirement to negotiate typical challenges, most around times of transition. For instance:

- Separating from a parent when entering day-care or preschool,
- Entering primary school,
- Primary school developmental challenges such as learning to regulate eating, sleeping, attention, impulsivity,
- Entering high school,
- High school developmental challenges including sustaining attention and concentration in a more difficult environment, making and sustaining friendships, developing a moral and sexual orientation, separating and individuating from family, regulating emotions in the face of more complex challenges,
- Resisting peer pressure including taking alcohol and drugs, and
- developing more sophisticated coping mechanisms.

Abnormal crises

Are synonymous with the ACEs detailed in chapter 2 and include:

- verbal abuse, physical abuse, sexual abuse,
- physical neglect, emotional neglect,
- divorce and separation,
- living with a parent with a mental illness,
- antisocial and criminal behaviour within the household.

6.2 The Developmental Model

Given infants, children and adolescents are continually developing, the other obvious conceptualisation of complex severe mental health presentations is a developmental model.

Referring to the example, Figure 6.2 “continuities for boys with aggression”; the X axis is time divided into summary developmental stages and the Y axis is a summary of improving competence over time. In Figure 6.2, with the example of developing antisocial personality disorder, epidemiological data is very clear that the origins of this condition are coercive parenting in childhood. Individuals who have been subject to this are more likely to be dys-regulated in the classroom, have numerous suspensions from school and in later primary-early high school interact with other individuals who have also had this experience. This group of antisocial peers often engage in early drug and alcohol use, and oppositional, defiant and antisocial behaviour. For some, especially those that lack empathy, they go on to develop antisocial personality disorder.

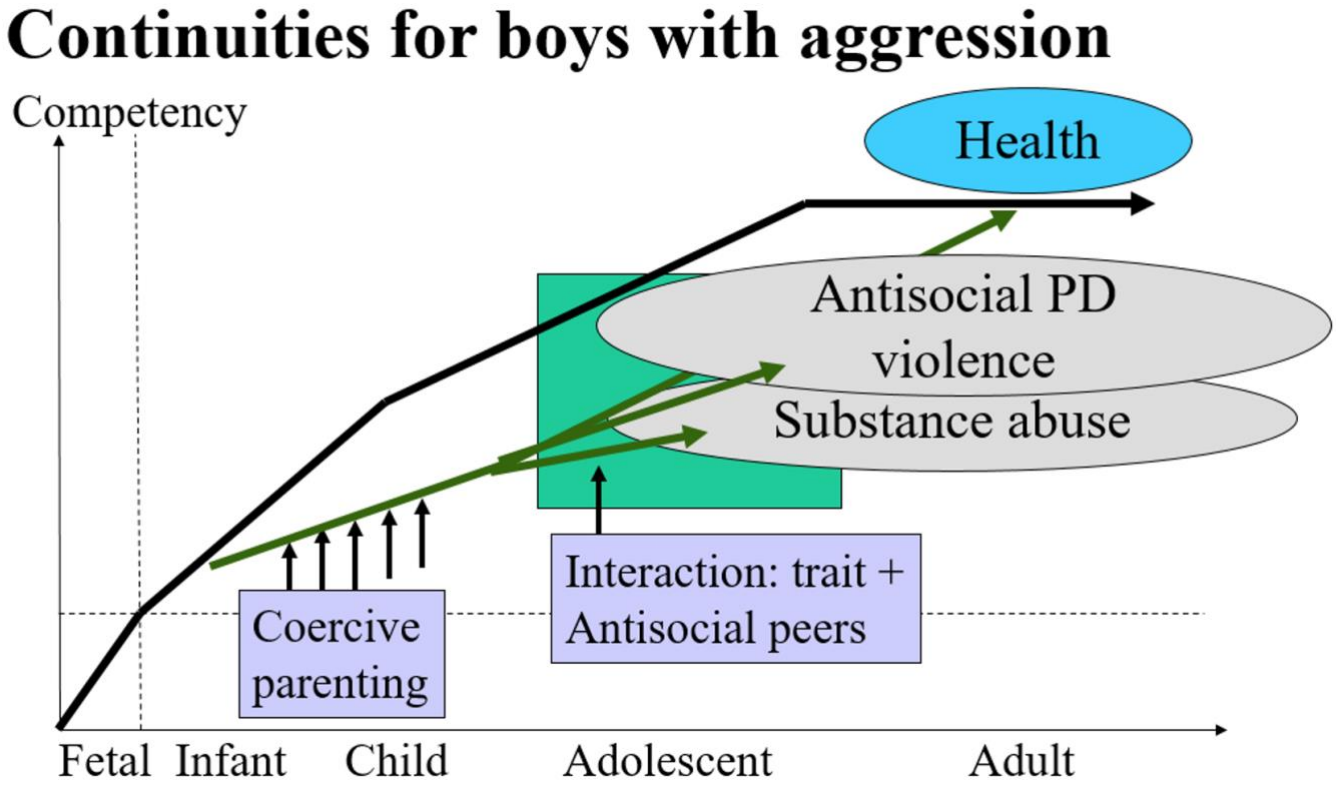


Figure 6.2 *Applying a developmental model to aid understanding the development of Antisocial personality disorder.*

Using the developmental model to summarise the research findings of the previous chapters emphasises the crucial fetal developmental period. During this period and extending into the first years of life, early abuse and neglect cause profound epigenetic changes that have been detailed. This developmental period is also likely to be the onset of a poorly regulated stress response system and the beginnings of structural brain damage.

Behavioural and mental health manifestations in the infant/early years stages include anxious or avoidant attachment, dys-regulated behaviour such as difficulty establishing a sleep and eating routine, and a lower capacity for being soothed by a parent or caregiver.

An anxious or avoidant attachment makes interactions with other children at childcare difficult. In the early school years, attachment problems lead to difficulty establishing friends; whilst impulsivity and concentration difficulties makes it more likely there will be disruptive behaviour in the classroom and the beginnings of academic underachievement. These behavioural problems become ingrained and often continue throughout primary school. Serial school suspensions and lack of the academic progress make the school environment challenging if not frankly aversive for these young students. School refusal, often in the form of truant behaviour, becomes established and facilitates the formation of antisocial peer groups. Minor criminal behaviour and drug and alcohol use, especially in boys, become the norm. In girls, dislocation from school is often less marked but underlying insecure attachment, low self-esteem and self-efficacy, difficulty establishing and maintaining friendships and lack of social connectivity lead to more gender specific responses to trauma including repeated DSH.

6.3 Suicide Risk Assessment

The most likely place a suicide risk assessment is undertaken is when a young person has been brought to a hospital Accident and Emergency Department. Earlier in this report data was provided that such presentations are increasingly common across Australia. Clearly suicide assessments also occur in many other therapeutic settings: a GP's office, at a child and youth mental health clinic, by a school guidance officer, in numerous other settings where a young person sees an individual with mental health training.

The information gained from a suicide assessment is often cross-sectional. The practitioner will analyse the event and determine whether there was suicidal intent and how dangerous was the method. Suicidal intent is determined by pre-meditation including researching the method, purchasing or otherwise gathering what is required to undertake the desired method, finalising business and saying goodbye, and leaving a note. Dangerousness this is about the lethality of the method with more lethal methods including hanging, jumping and using firearms. Less lethal methods include taking over-the-counter or prescription medication. In these assessments the past or current history of a mental illness is always important, so to the history of past suicidal ideation and attempts. Often there is not time for a more comprehensive mental health assessment.

6.4 Cumulative Suicide risk

On many occasions some young people seem to undertake very serious suicide attempts following a seemingly trivial event. Examples of the latter include arguments with a parent or a current girlfriend or boyfriend; interactions which did not appear to be either very intense or serious. Figure 6.3 highlights the threshold for an illness or suicide attempt and

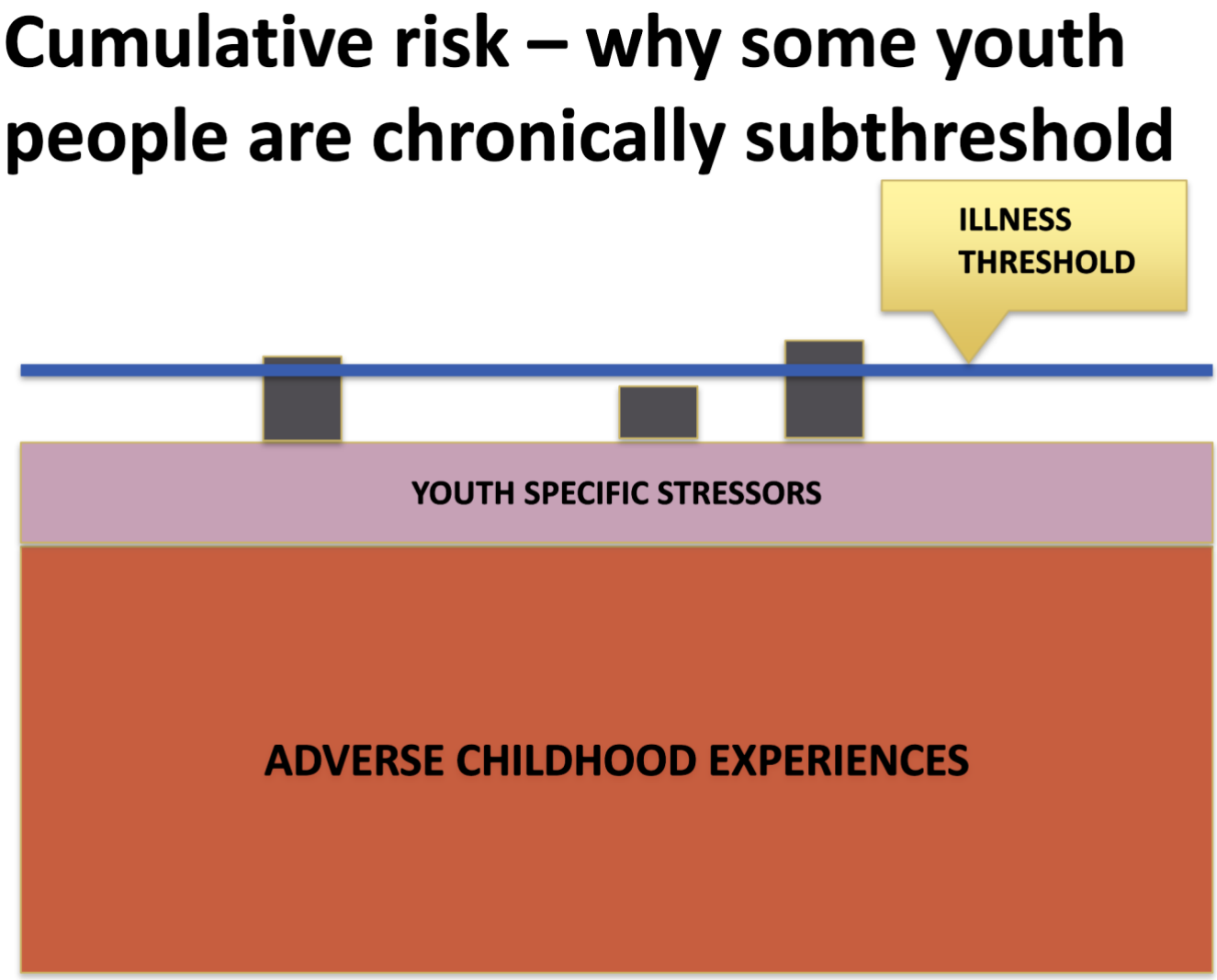


Figure 6.3 *Cumulative suicide risk*

three examples of seemingly small events: two of these events push the individual over the threshold.

Importantly this individual is chronically close to the threshold for a suicide attempt.

The figure suggests that youth specific stresses such as examinations stress or problems with a peer-relationships are only a small contributor to being close to the threshold. A much greater contribution to being near the threshold for an illness or suicide attempt is from ACEs.

In figure 6.4 the mechanisms linking ACEs to vulnerability are summarised. These have been previously reported, and include epigenetic mechanisms, changes in the stress response, neuro-inflammation and structural brain damage, and the psychological constructs of attachment and dysregulation of emotions. There needs to be a greater understanding that

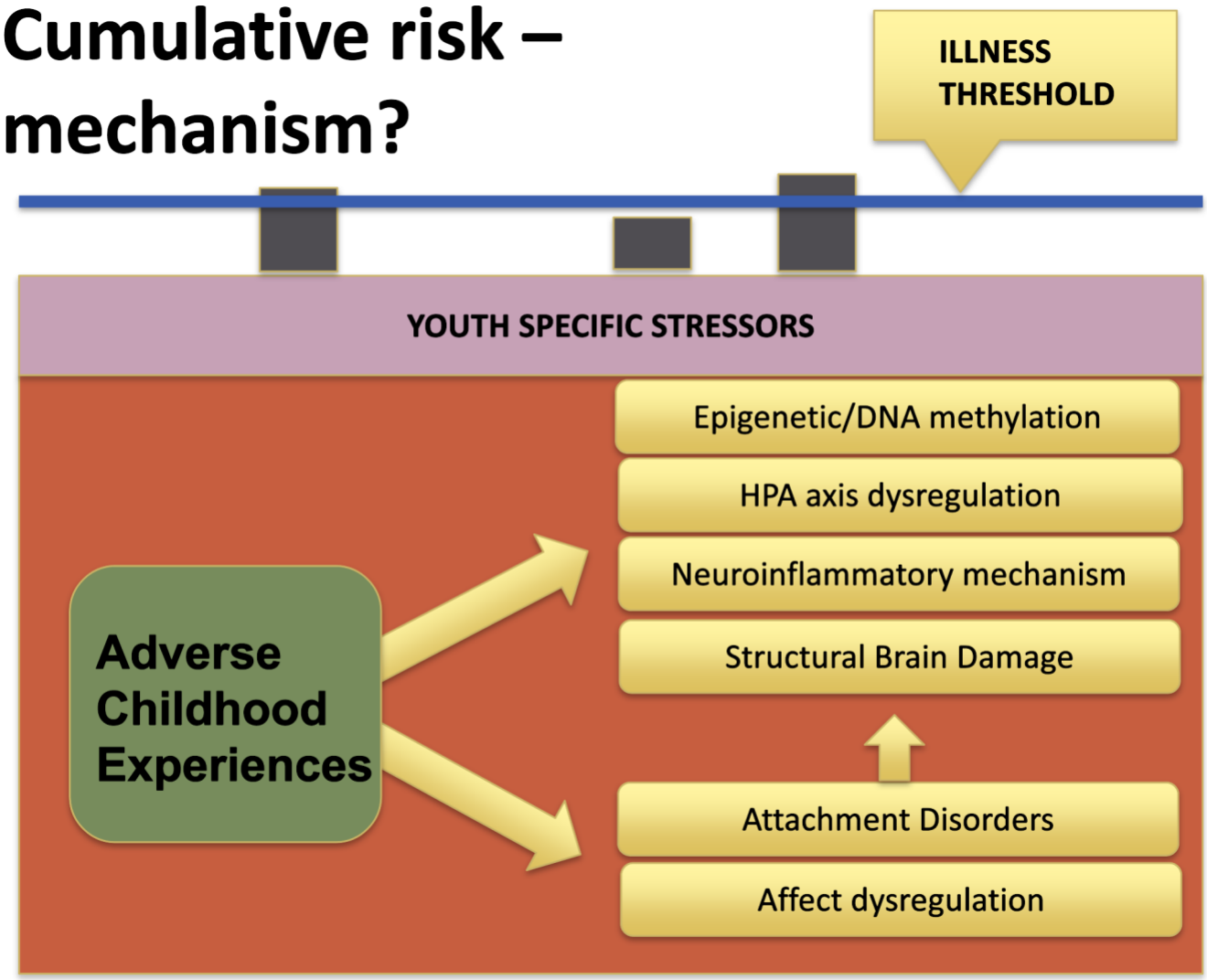
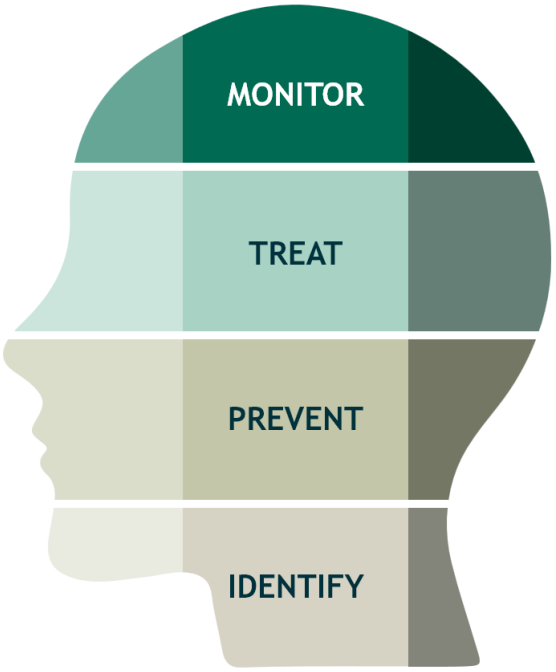


Figure 6.4 *ACE links to cumulative suicide risk*

many children in the child protection system, inclusive of all those with significant past trauma histories, are chronically near the threshold of a suicide attempt. Any suicide assessment in this group needs to be mindful of past traumatic experiences.

7

REVIEW OF CHILDREN WHO COMPLETED SUICIDE



Included in this review is child protection and related documents about eight young people who completed suicide. This was not a systematic review in that neither all cases of completed suicide over a time period were included nor were the cases provided a random sample. A methodological strength was the cases were a consecutive set of the last 8 cases.

The purpose of reviewing these documents is to consider the wider issues i.e., how do these cases fit or not fit with the emerging knowledge (epidemiological and biological) about suicide in OOHC children and how do these cases relate to the review of policies and procedures.

7.1 Key findings

Key demographic features include the age range of the individuals when they completed suicide was 12 - 17 years, 4 were male 4 female, and 4 were of Aboriginal or Torres Strait Island descent. Even at the level of demographic data there are some notable findings. There is gender equivalency rather than the usual over representation of males who complete suicide. Second, the proportion of those who are of ATSI descent is far greater than the population prevalence.

All individuals chose a method of suicide with a high likelihood of success in that seven died from hanging and one from asphyxiation. It is notable that all females who completed

suicide did so by hanging. It has been a long-established research finding that females attempt suicide approximately two to three times more than males. However, males' complete suicide approximately three times more often than females because they choose highly lethal means such as the use of firearms, jumping or hanging. Females tended to use less lethal means such as an overdose of prescription or over-the-counter medication. For some time, clinicians have been worried there was a trend towards females attempting suicide with more lethal mean such as hanging. This is the case in this small case series; all 4 females in the series completed suicide by hanging.

In approximately half the cases there was evidence of pre-meditation. In one case this involved extensive preparation including buying a gas cylinder and using it to create a means to asphyxiate. Three individuals wrote goodbye notes. One posted threats of suicide on Facebook. Premeditation is the most obvious indication of strong suicide intent. When uncovered in a suicide assessment premeditation is a strong reason to instigate an urgent therapeutic intervention. The only caveat to this is the individual who frequently posts threats of suicide on social media. This is usually in the context of BPD (including emerging BPD).

Several of the young people were very aroused prior to committing suicide. This included one individual who had a recent fight with a sister and was noticed to be angry prior to the event. Two other young people experienced ongoing conflict with their mother. It is highly likely one individual was chroming and potentially delirious at the time of their suicide.

In terms of ACEs, other than one outlier, all cases had between 4 to 6 documented ACEs. This placed them in the highest risk categories for both physical and mental health morbidity. Considering the research earlier in this report it strongly suggests they would have experienced epigenetic change, dys-regulated physiology and the likelihood of evidence of brain damage.

The most common ACE was parent separation and indeed in all cases families had spent some time separated. In most cases there was only either a single parent or a grandparent as the main caregiver.

In 7 out of 8 cases a parent experienced either a mental illness or substance abuse disorder. In many cases these presentations were very serious. For example, a father with schizophrenia or mother with bipolar disorder. Two mothers and a father had a serious alcohol addiction, one father abused methamphetamine. One father committed suicide by hanging. The self-harm of relatives was a theme in approximately half of the cases. One mother had recurrent suicidal ideation, another attempted suicide. In one Indigenous family an auntie completed suicide by hanging and a sister threatened suicide by hanging. The father who completed suicide by hanging was also Indigenous.

The child protection history of the reviewed cases varied from one young person who had only one report of a 'child in need of protection' and one individual who was in OOHC to 2

individuals that had five or more reports. In the two cases of large numbers of child protection reports, these started very early in life, indeed before one year of age. This placed these two individuals in the highest category of potential biological and psychological damage. Given the nature of access to information and inherent difficulties with investigations these high levels of notifications are likely to be a significant under-report.

The documented mental health and substance use history of individuals prior to completed suicide were very variable. It is likely that 4 of the 8 young people had a mental health diagnosis: one of depression diagnosed by a GP and one with anxiety after an inpatient stay at the Queensland Children's Hospital. Another two individuals had both community and inpatient CYMHS involvement. In these cases, there is no further information including diagnosis in the documents provided. Only one young person was on medication: the anti-depressant Fluoxetine. The information provided suggests that 6 of the 8 young people had past recorded histories of deliberate self-harm or suicide attempts or both. In one case the suicide attempt was by hanging. Four of the 8 young people had issues with drugs, two of these were sniffing petrol and two were using marijuana. Three of the four substance users including both who were petrol sniffing were of Aboriginal descent. Somewhat of an outlier was the other drug user in that this was a young 13-year-old female who was a heavy user of marijuana (up to 10 bongs per day).

7.2 Commentary on case reviews

i) Applying the explanatory models outlined in this report.

Firstly, applying the omnibus model (Figure 6.1); consistent with a severe and complex presentation the details of the cases demonstrate important risk factors summarised across many aspects of model. There is most objective evidence for family factors including parent challenges with mental health and substance abuse, the absence of fathers, parent stress secondary to housing issues and the likelihood of poverty, and inconsistent parenting. An important family factor not previously mentioned was that in many cases siblings were violent towards the young person who completed suicide or other family members. Siblings were also engaged in substance abuse or criminal behaviour. Individual factors are less objective and more extrapolated from the research literature which includes the previously reported biological changes. One could speculate about poor decision making in those who chromed or engaged in heavy substance use at an early age and whether this was made worse by executive functioning/frontal lobe deficits. Modelling of this behaviour in communities in which drug use is endemic is another important factor. Abnormal crises include the very high levels of reported ACEs. Very few individuals had any helpful solutions to their mental health challenges. For example, disengagement from school was common which in turn leads to lack of social connectedness, fewer friendships and peer relationships with individuals who can model positive coping, and more interactions with less functional peers. From a developmental perspective these issues were often operant from very early in life and continued as a developmental continuity over time.

ii) Mental Health issues including self-harm

Help seeking and involvement with the mental health system is a very relevant consideration given that at least half of the group had some formal involvement with mental health services, possibly a greater number if documentation from Queensland-Health was available. Further, 6 of the 8 cases had a prior assessment for DSH or a suicide attempt.

For the mental health service provider review of relevant research confirms a 5 fold increased likelihood of a mental health disorder in those who are in OOHC and a 2 to 3 fold increase of those who have some dealing with a child protection system. Further, there seems to be a dose response with increased likelihood of a mental disorder correlated with increased number of ACEs. A counterpoint is clearly the majority of young people who self-harm do not complete suicide.

There is anecdotal evidence, and certainly an area that warrants more inquiry, about a reluctance of some child and adolescent mental health services to be involved in these cases even though they are complex and severe presentations. Whilst elaboration of this requires an in-depth review of the relevant mental health documents and discussion with CAMHS clinicians and mangers, what was provided to this review provides some insight. In 3 of the 4 individuals with documented dealings with the mental health system the notes stated that these young people did not pursue interventions with mental health or drug and alcohol services because of lack of engagement. In one case this was an Indigenous young person who did not engage with an Indigenous service provider. A traditional conceptualisation may see this lack of engagement as a deficit in the consumers' motivation to change or the consumer's ability to tolerate a one-to-one counselling session or a group-based program. It is important to note that some other service system such as Multisystemic therapy (MST) do not hold this view rather see engagement of the consumer as the responsibility of the therapist. The MST position is if the consumer is not engaged it is because the therapist is not providing an intervention that is developmental or culturally appropriate or is consistent with the intellectual or social competence of the consumer. The issue of engagement can be extended to parents and caregivers. In reality, engagement can be very challenging. In one of the reviews case workers often noted a hostile response to them by family members. Programs like MST would argue that you cannot improve the effectiveness of a parent unless you help the parent with their issues around substance abuse, a mental health presentation or functioning that relates to their own experience of abuse. In the Australian context, MST was instigated in Western Australia by a specialist CAMHS service to improve service access and engagement for very vulnerable families with complex needs; significant improvements at 6 and 12 months post-intervention were noted (Porter, Nuntavisit, 2016).

iii) Intersectoral contact

In the majority of cases there was evidence of contact with various services from an early age. In 4 cases, all Indigenous young people, there were comments that the young person had contact with police. In two of these cases contact was said to be 'extensive'; one young person had multiple property offences and spent some time in the Brisbane Youth Detention Centre. Two other individuals were known to the police because of criminal activity and one because of petrol sniffing. The Education Department was often involved in child protection or mental health issues. In 2 of the 8 cases, school authorities referred individuals on to interventions and in another case it was clear the school was actively monitoring a child who often presented at school without food or appeared unkept. From the consumer perspective they often viewed the school as a place where they were bullied. In 3 of the 8 cases, the young person had stopped attending school. For one individual school was clearly an important resource in that during COVID their mental health became much worse when they were not able to attend school.

Published Queensland research reported that children with complex needs obtain services from multiple providers. Of 19 children, mean age 12 years, referred to an interagency forum due to their complex needs on average they had attended 5 schools, had 11 residential placements and were involved with 6 agencies (Lee et al., 2004). It is very likely there would be similar findings with this case series, however, further analysis of intersectoral collaboration was not possible with the information provided. This would be a very worthwhile undertaking and formal analysis of service integration is an important omission from the research literature. To be informative such an analysis will would require at a minimum access to mental health, education and police files that relate to individual cases

iv) Service delivery

Consistent with comments in section (iii) the provided notes were not detailed enough for in-depth comment on the service provision received by the 8 children in the child death review. However, there is a literature, trauma-informed care, that is informative about what programs are most likely to be successful.

There has been steady progress in the adoption of trauma-informed care across many service sectors including health. Key elements of this approach including education on the link between trauma and psychopathology, physical mobility, self-harm and suicide risk. Psychoeducation is also required on the delayed mastery of normal developmental processes and traumatised individuals seeing the world in a different way. For instance, not adhering to the fundamental cognitive schema that the world is a safe place ("just-world belief") and that relationships are positive useful processes. Rather for many traumatised individuals, wariness and vigilance are useful, and most relationships are at best unreliable and often lead to further trauma. Trauma-informed care does not focus on a diagnosis-exclusive paradigm but how someone's trauma history affects the signs, symptoms and

response to interventions of any given diagnosis. Trauma-informed care accepts that the prognosis of many presentations is more guarded, and the duration of time required to make therapeutic gains is longer. It is understood that engagement is more difficult, and problems are more complex.

There have been some initiatives which have purposefully sought to increase the implementation of trauma-informed care in large organisations. The Massachusetts Child Trauma Project provided training and consultation to managers and clinicians across a large organisation and created trauma informed leadership teams to help implement change (Barto et al 2018). Another US project instigated a four-phase implementation model. One important aim was inter-professional collaboration; evaluation demonstrated high participation rates and significant increases in trauma-focused practices (Hanson et al., 2018). Of note there is now a measure of cross system collaboration, with good psychometric properties and potential to track changes in collaboration during a process of reform (Crandal et al., 2019).

Complimentary to initiatives at the organisational level, there have been developments in interventions for individuals. Taussig and colleagues undertook a randomised control trial of the Fostering Healthy Futures program with 426 children recently placed in OOHC. They were able to demonstrate very high engagement (95%), very high intervention completion (85%) and significant reduction in mental health and trauma related symptoms (2020). Of note the quantum of care - a 30-week mentoring and skills acquisition group program - was significantly more than the average care delivered by a child and adolescent mental health service.

From the parents' perspective there now are initiatives that aim to increase trauma-informed parenting. The Resource Parent Curriculum was designed to improve trauma-informed parenting for the parents and caregivers of children in OOHC. In a pre-post workshop design of 314 attendees, improvements were noted on tolerance of child misbehaviour, trauma-informed parenting and parent self-efficacy (Murray et al., 2019). A more difficult task is to change the behaviour of parents who have their own histories of exposure to trauma or are regarded to be at risk of maltreating children. In a randomised control trial comparing the parenting STEP program and a group attachment-based intervention (GABI), the latter demonstrated significant improvement in maternal support, reciprocity and decreased maternal hostility (Howard et al., 2019).

Several Queensland initiatives are worthy of note. Evolve Therapeutic Services (ETS) is funded by the Queensland Department of Communities Child Safety and Disability Services and is delivered by Queensland-Health. Referrals are only available through child protection services. The service is for those under care of the Department who have severe and complex needs, a high level of risk and severe functional impairment (ETS, 2013). Hallmarks of ETS include the need for intense mental health interventions in the context of a collaborative interagency service response, and the need to understand the psychological and behavioural impact of child abuse and neglect (ETS, 2013). Intensity of intervention is

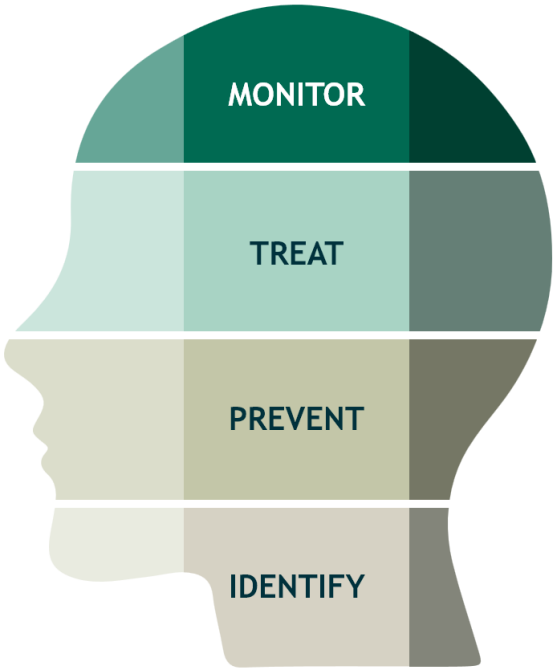
facilitated by low therapist caseload. Collaboration with and support of residential care providers is included in the model.

A more recent intervention is the assertive mobile use outreach service (AMYOS). This mobile, not clinic-based service is intended to improve engagement and reduce access barriers. With the added benefit that over time young people and the families may develop increased willingness to attend a less intensive clinic-based services.

These services are more likely to be integrated with larger Child and Youth Mental Health Services. Further, it is likely service access favours consumers in larger population centres. Future planning of these more intensive therapy services in Queensland would benefit from an analysis of service geographical cover and how this relates to child protection data on substantiated cases by region. A formal evaluation of ETS and AMYOS service outcomes would also be of significant benefit to service planning. Any evaluation must include a sub-analysis of service use and outcomes for Aboriginal and Torres Strait Islander consumers. As well as learnings about engagement with this consumer group.

8

REVIEW OF POLICIES AND PROCEDURES



Nineteen policies were provided and included in this review. To assist with analysis policies were rated using a reference grid that included five categories: readability (ease of understanding and expectation of some clinical knowledge); clarity of purpose; mental health knowledge (reference to known risk factors and reference to known protection factors); reference to policy and legislation; and foundation knowledge (reference to psychological knowledge and biological knowledge). Likert scales were devised for each category that range from 1 to 5. For example, for the category mental health knowledge - reference to known risk factors, ratings ranged from 'no reference identified' to 'risk factors identified with clear examples and/or case studies'.

The policies were divided into youth justice policies (n=10), education policies (n=7), and child protection policies (n=2).

8.1 Juvenile justice policies

All youth justice policies scored in the highest two categories for ease of understanding. All policies did not require clinical knowledge for them to be understood and all clearly identified the responsibilities and expectations related to the policy.

In terms of risk factors, 2 of the 10 policies (YJ-13 and YJ-17) were in the highest category were risk factors were clearly identified with examples and/or case studies provided. YJ-13 is an operational policy and procedure, title: Identifying, recording and managing suicidal risk and contained very relevant information on risk factors. Consistent with other sections

of this report this policy may be improved by including the concept of cumulative risk and knowledge of ACE in the assessment advice. Note that a determination of the young person's ACEs would not need to occur during the suicide assessment. It would be a small administrative task to include an ACE assessment as part of entry into the juvenile justice system. It is also notable that two areas of the policy, assessment categories and the procedural checklist, could be converted into a 'box tick' checklist which would greatly aid data extraction and subsequent data analysis.

Considering those policies that scored in the lowest categories on information about risk, this is often appropriate given they are operational policies and procedures that relate to business practices rather than interactions with consumers. For example, YJ-14 operation policy and procedure, title: Process following a completed suicidal death of a young offender. This policy is about notification of the event and reviewing practice.

There is, however, a trend that wider intersectoral collaboration is not implicit in the policy. For example, in YJ-14 the policy states, "ensure a notification is made to child safety if they are involved in the young person". There is no mention of informing Queensland-Health despite the possibility the consumer may have been an active case with child and youth mental health for many years. Similarly, no mention is made about informing the Education Department. The policy also states a reviewer will, "review all documentation related to the case management of the young person ". There are benefits to expanding such a review across sectors to develop a greater understanding of the management of the young person across time and across service systems.

Another theme across several policies is the possibility of including more insight into psychological and biological differences in traumatised children and adolescence. For example, YJ-16 Youth Detention Centre Operations Manual chapter 3 incident management: details that "all operational staff will receive training in emergency management during induction and at an annual refresher". The policy then lists that the training will include areas such as first aid, fire safety, suicide response, emergency management, PPE. One could argue that staff would benefit from another category, understanding emotions and behaviours in highly traumatised young people.

Two other trends were noted. All policies were in the lowest category when considering strengths and protective factors. Talking to a young person's strengths, including activities that are a strength, are powerful ways to engage the young person. Further, nearly all policies scored in the lowest categories around new knowledge related to adverse childhood experiences. This should not be seen as criticism. Rather in the usual cycle of policy review, revision and approval these new understandings could be incorporated into future iterations.

8.2 Department of Education policies

The majority of the Department of Education policies scored in the top two categories for ease of understanding and no policy required a clinical background for it to be easily readable. DOE-5 Suicidal thoughts and behavior was the most difficult to read. This policy included sections with long lists of dot points. Resolving this into a better organizational structure would be helpful for the reader. It would be useful to include the concepts of suicide intent versus suicide risk and cumulative risk in this new structure. There were also omissions such as the much higher rate of deliberate self-harm and completed suicide in children and adolescents with an ACE history. Another omission was the issue of harm being more likely if the young person used alcohol and drugs.

All Department of Education policies scored in the highest two categories on clarity and the responsibilities and expectations related to the policy. The exception was DOE-16, Student learning and well-being framework. Whilst it was unclear where this document was placed in the wider structure of education policies, the document should be commended for the very engaging and approachable graphics, its strength-based language and clear links to other resources.

Very similar to the juvenile justice policies there was little reference in Department of Education policies to known risk factors. However, unlike the youth justice policies the Department of Education policies had a range of embedded links to more detailed information. For example, DOE-15 Supporting students mental health and well-being, only talked in general terms about student social and emotional well-being. However, this document was rich in links to other resources such as the mental health resource hub, mental health difficulties webpage, and complex case management link. Unfortunately, information in these links was not included in this review given time and scope limitations. Further, the links required a DoE employee login. DOE-10 Suicide postvention for schools, is also notable by the clear and very helpful graphic that details the steps in the immediate response to a completed suicide or suicide attempt, and the checklists of key activities that required the date and time they were completed. Another significant positive about this policy is the clear directive about intersectoral collaboration. On page 7 of DOC-10 the policy states (in highlighted text), “Postvention collaboration between schools and mental health professionals are greatly enhanced when there is a relationship or partnership already established. The text goes on to remind educators of the regional ED-LinQ coordinator whose central function is to maintain professional relationships and specifically to collaborate with child and youth mental health.

In terms of the incorporation of foundation psychological and biological new knowledge about ACEs and a focus on traumatised children, the Department of Education policies reviewed generally had only minimal information. This may or may not be the case, in that it is dependent on what information is provided in the policy’s embedded links. It is likely that similar comments to those made for youth justice policies could be applied, that is

with future iterations of these policies the opportunity exists to incorporate more contemporary knowledge about these young students at much higher risk.

8.3 Department of Child Safety Policies

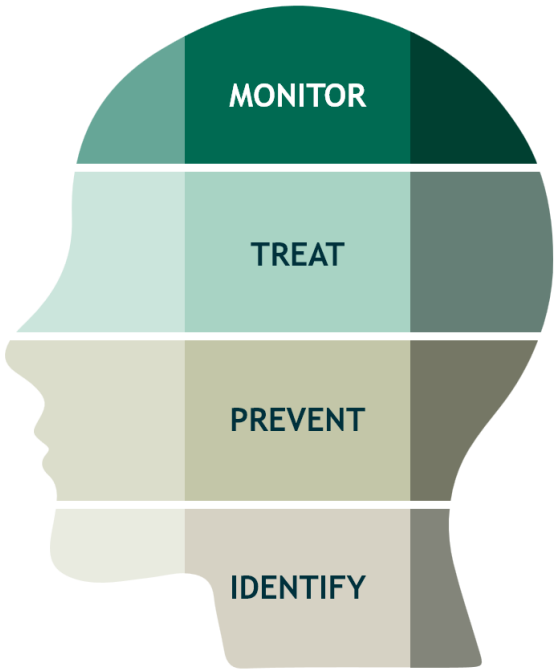
Two Department of Child Safety policies were included in this review, both scored in the highest two categories of readability both in terms of ease of understanding and not requiring a clinical background to understand the policies. Both policies where in the second highest category in terms of identified responsibilities and expectations.

The document Practice Guide Self-harm and suicide risk, was the highest scoring document in the review in terms of incorporating known risk and protective factors. On page 1 of the document there is a lengthy dot point list of risk factors. The document would be improved if these were resolved into categories such as the individual, family and contextual factors (e.g., Omnibus model). Continuing this theme, page 2 of the document lists 34 dot points (which continue on page 3). Many readers would find this list overwhelming. A lengthy list is also a missed opportunity to educate on issues such as suicide intent versus risk, and cumulative risk. The document should be commended for including a separate section on young people in detention and a more extensive discussion of additional risk factors for Aboriginal and Torres Strait Islander young people. This document scored in the lowest category of including foundation knowledge of a biological nature and the second lowest category on foundation psychological knowledge. Future iterations of this document could address this. Further, the document does not reference other service sectors. This is important because much of the knowledge of the developmental trajectory of the young person and more detailed knowledge of their mental health reside with Queensland Health, General Practice and mental health practitioners. Much information about the social connectedness (a known protective factor) and the individual's cognitive functioning is known by Department of Education practitioners. This document could be improved by noting the importance of information from other sectors.

The other included Department of Child Safety policy, 605-3 Assessing and responding to self-harm and suicide risk, is an overarching policy and therefore it would not be expected that it includes detailed references to known risk and protective factors or recent foundation psychological and biological knowledge. However, the policy could benefit from the inclusion in the policy statement that research is very clear that children in the care of the Department of Child Safety are substantially more at risk of self-harm and suicide than the general population. Further under principles, the response to self-harm and suicide risk in a young person is the responsibility of all government departments and so intersectoral collaboration is strongly encouraged.

9

THE CHILD PROTECTION MENTAL HEALTH INTERFACE



9.1 Child and youth mental health perspective

To understand the need for better integration of child protection and mental health systems it is useful to briefly understand the historical development of child and adolescent mental health services (CAMHS/ CYMHS in Queensland) aspects of which have led to a structural barrier to integration.

CAMHS services developed from the child guidance movement which was a clinic-based model of care. The role of the family was central to the model, so to parent effectiveness interventions. It follows that CAMHS services in Australia were influenced by family therapy. Very few services currently exist in which family therapy predominates, especially given the burgeoning influence of clinical psychology (interventions like cognitive behaviour therapy), as well as advances in psychopharmacology including medication with effectiveness for ADHD, depression and anxiety. Traditional CAMHS services were not specifically orientated to a particular diagnosis or consumer group. The latter has changed recently with specialist teams for individuals with eating disorders and some specialist groups with strong academic links for conditions such as OCD and other forms of anxiety.

Developments of the CAMHS system of care include the addition of inpatient units. Arguably this was influenced by the routine development of inpatient units in adult mental health. Given child and adolescent inpatient units are not regularly treating large numbers of individuals with psychosis, the length of stay is generally shorter in CAMHS inpatient units. There are strong arguments that a longer length of stay in child and adolescent units promotes negative outcomes such as institutionalised behaviour and symptom contagion. Some jurisdictions have day programs which provide an intense therapeutic experience as

well as the necessity for the individual to return home in the evening to practice new skills in their own social ecology. These services are less restrictive and costly compared to inpatient units whilst seeing consumers with the same level of psychopathology (McDermott et al., 2002).

The applicability of these service models have been challenged by consumers with conditions which have very poor treatment outcomes such as severe disruptive behaviour including conduct disorder in children. Innovations such as Multisystemic therapy (www.mstservices.com) have sought to provide new models of care which are not clinic based, have improved service access and potential for engagement. Another recent innovation is specific teams for OOHC children such as the Evolve Therapeutic Services in Queensland.

Finally, both adult and child mental health services in Australia have been challenged to adopt a stepped care approach. Figure 9.1 is a summary of a stepped care model for depression. In this example of treating depression, level one involves psychoeducation and self-help. Ideally this can be provided in a whole-of-population model. Level two, cognitive behaviour therapy can be provided to many individuals either online or by using a supervised non-clinician (e.g. a coach) to deliver therapy. Level three is what many would recognise as typical care: receiving psychotherapy from a trained clinician and/or receiving an anti-depressant such as a SSRI from a GP or psychiatrist. It is generally acknowledged that most patients who see CAMHS should be at level four. In this example consumers typically present with depression and other comorbidities such as a learning disorder, a mental health comorbidity such as anxiety, being on the pervasive developmental disorder spectrum, or having significant family difficulties such as a parent with a mental illness. Level four interventions require a multidisciplinary approach provided by experienced clinicians.

9.2 Child protection perspective

The dilemma from the child protection perspective is the juxtaposition of an increasing understanding of the mental health needs of children and adolescents in care, with the perceived barriers to CAMHS accepting these consumers. Typical reasons for either non-acceptance or hesitancy in acceptance include placement instability undermining the continuity of a course of therapy; difficulty working with time-poor foster parents or kinship carers; the perception of an increased likelihood of not attending appointments due to other time commitments or insufficient resources to attend; a perception of a lower therapy effectiveness with this group of consumers especially those who have disruptive behaviour disorders and concerns the admission of this consumer into an inpatient unit would lead to a placement difficulty on discharge. Some clinicians feel long-standing child maltreatment leads to a cognitive schema of suspicion of adults and lack of the benefit of relationships. Clinicians then argue that all their therapy is relationship based and this relative deficit in maltreated children makes their therapeutic interventions less likely to succeed. Historical

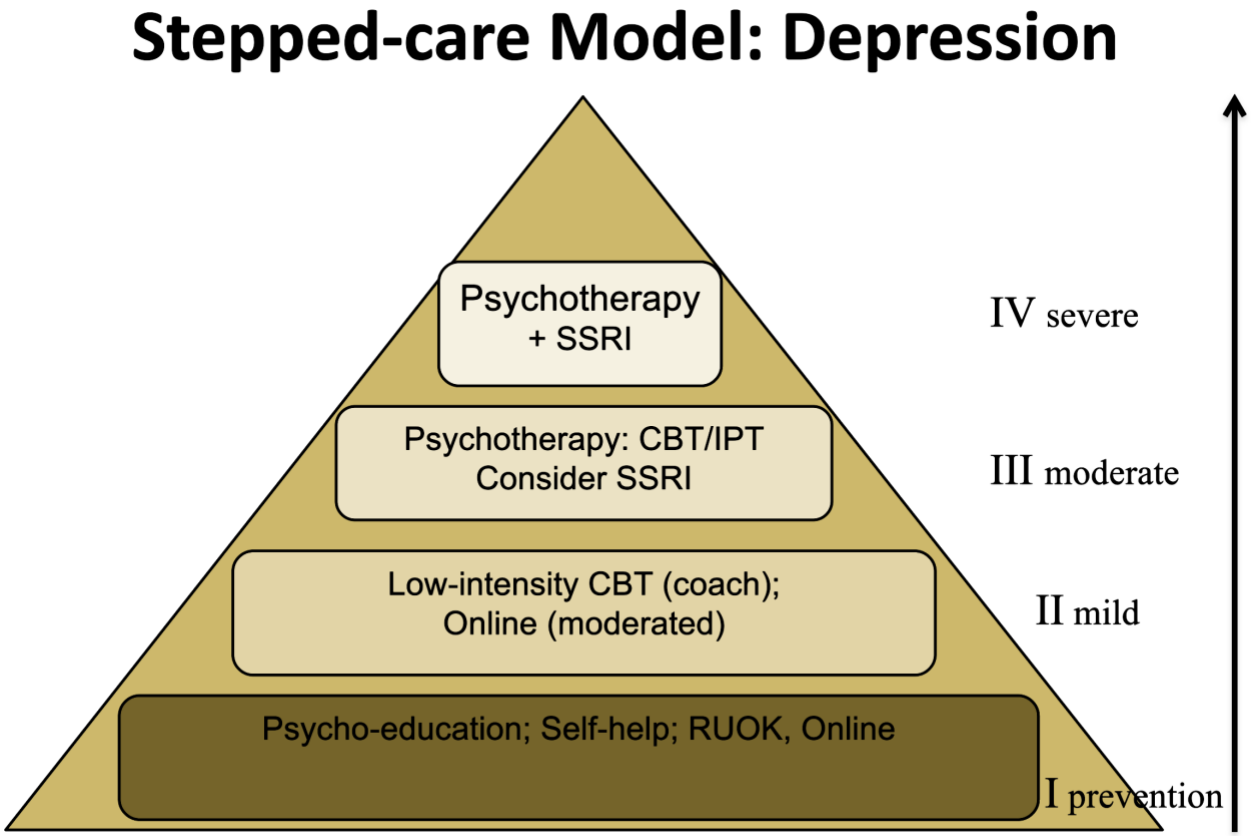


Figure 9.1 *An example of a stepped-care service model*

non acceptance of maltreated children into some CAMHS has caused some practitioners to not attempt referral to this service system.

9.3 Improving integration

Consistent with any two individuals, two families or two organisations that need to interact, lack of knowledge and exposure to the counterview leads to misinformation and non-willingness to engage. These tendencies need to be counted and this begins with senior leadership.

Mental health and child protection policies and business practices should emphasise strong collaborative relationships between service providers, especially team leaders and senior practitioners. Ideally these individuals should meet regularly. If no clinical/case-based agenda item for the meeting, it should proceed regardless, simply to establish a personal working relationship between these senior staff. Too often meetings are ad hoc, or only occur around crises which involve the most extremely challenging consumers. In collaboration, senior leaders of both systems should instigate a range of cross sector initiatives including developing a shared understanding of this consumer group, sharing training and engaging in regular complex care meetings. The reality that all processes are

transactional should be understood and respected. To this end, child protection should contemplate streamlined notification procedure from senior child and youth mental health staff whilst senior mental health staff should consider streamlined assessment acceptance of child protection consumers.

9.4 Further service innovation

ETS has in-built integration by a referral pathway through an integrated child protection - mental health panel. Integration is also promoted by one organisation funding the other to provide services. This model should be encouraged.

Two other service innovations, which could work on a similar model, are worthy of consideration. The analysis of biological change experienced by maltreated children in the form of epigenetic change, stress system dysregulation and brain damage create a clear imperative to provide services earlier in the child's development.

Our current system requires a child to be old enough to present with worrying emotions and behaviours that are usually identified in the school system, in the health system (e.g., general practice or at Accident and Emergency Departments) or identified by other services such as the police. Infants and preschool children are much less likely to be identified through these mechanisms. This in no way implies that infants and preschool children are not symptomatic or that they are not actively undergoing psychological or biological damage. Our systems need to reform to acknowledge that any infant or preschool child who has experienced four or more adverse childhood experiences is worthy of an intervention at the age this was identified. This is not 'early intervention'. This is an indicated response to a current presentation. This timely intervention will have the added benefit of preventing or minimising the condition worsening, requiring interventions at later ages. It is hoped our next investment in the lives of maltreated children is during infancy and the pre-school years and will include supporting and providing interventions to parents who themselves have mental illness or substance abuse disorders and/or their own experience and responses to being abused. The placement of this recommended innovation in a suicide prevention report is important. One of the reasons the suicide rate has not changed is likely to be that our interventions are 15 to 20 years too late for many individuals.

The other crucial service intervention is around the issue of engagement. Queensland has experimented with the use of Multisystemic therapy with children who were maltreated. A Queensland MST trial was not successful, partly because it was the first trial in the world of MST with the children under the care of child protection (Colleston et al., 2010). Important lessons were learnt (Bor et al., 2013) and a more mature service, MST-CAN has now demonstrated engagement with this group of consumers and improved outcomes in terms of reduced abusive parent behaviours, parent and child mental health and reduced out of home placements (Swenson et al., 2018).

9.5 Summary

Structure and Function of Interface between mental health and child protection systems

CAMHS services should be structured so that:

Children and adolescents with very prejudicial pasts, high numbers of ACEs and currently have severe and complex mental health needs that involve high risk:

- Should be seen by ETS, maintaining the current integrated child protection – mental health assessment panel and funder-provider payment model.
- Elements of best practice of this service are well defined:
    - Individuals can be referred to the panel from multiple agencies
    - Whilst clinic-based appointments are appropriate, serial appointment 'DNA' should never be a cause of discharge from the service, rather a reason to initiate a mobile response.
    - The first response to school disengagement is understanding the barriers to school attendance, (personal, peer related, family related) followed by activating of both the individual strengths and strengths within service responses to make attendance a more desirable option.
    - A school disengagement intervention may be for a risk factors such as the experience of being bullied, or treatment of a mental health condition such as school phobia.
    - Red flag behaviours for suicide include an understanding of cumulative risk, that is individuals who are chronically near the threshold of suicide and self-harm, as well as more widespread knowledge of intent (often evidenced by premeditation) and a preference for an extremely high-risk method. Recent changes in social connectedness which may include changes in residential placement, peer group or school attended are often precipitating factors.
    - Child and youth mental health services are well-placed to provide contemporary interventions to prevent suicide. The key issue is ability to engage these consumers including the capacity for a mobile assessment in the community.
    - Well established collaboration between senior service professionals is a proven way for such assessments to be facilitated.
    - Consistent with a contemporary model of care high-risk individual should be flagged within CAMHS services. This 'flagged' status should be regularly reviewed and acknowledged by all team members. This allows appropriate responses should the case manager not be available.

For young Indigenous consumers with very prejudicial pasts, high numbers of ACEs and currently have severe and complex mental health needs that involve high risk:

- Consideration should be given to creating a Multisystemic Therapy Team, inclusive of an integrated child protection – mental health assessment panel and funder-provider payment model.
- Importantly whilst such a Team is likely to be sited in a major centre the team should have the capacity to supervise MST-informed interventions in rural and remote locations.
- Elements of best practice of this service (see MST guidelines)
    - Individuals can be referred to the panel from multiple agencies
    - Local Indigenous elders and community must either be funded to deliver the service or at a minimum be integral to the service delivery model
    - Local Indigenous involvement in the service would be expected at many levels
    - Clinic-based appointments are unlikely to be appropriate; service delivery should be where the young person feels comfortable
    - The service model cannot be a counselling style language-based interaction to create cognitive change; activity-based interventions that have meaning to the consumer are preferable
    - The model needs to be mindful that peers and siblings may present with similar difficulties. Not including these individuals in therapy is likely to be a barrier to change.
    - The model needs to provide practical support to whatever adult is seen to be the major caregiver. Maintaining this relationship is a service priority.
    - Given complexity of challenges with this consumer group, multiple systems need to be integrated into the care delivered.

Infants and Preschool children with very prejudicial pasts, high numbers of ACEs and currently residing with parents with a mental illness:

- Consideration should be given to creating an intensive infant/preschool child -parent program, inclusive of an integrated child protection – mental health assessment panel and funder-provider payment model.
- Elements of best practice of this service
    - Individuals can be referred to the panel from multiple agencies
    - Whilst clinic-based appointments may be appropriate, a home visitation capacity would also be very important
    - Contemporary treatment of adult mental illness and substance abuse would be key service elements
    - Parent-child therapy would be informed by attachment theory
    - The model of care would facilitate connections with local social, employment, mental health and other networks

Structure of Child Protection Systems

The research on adverse childhood experiences, whether children are in contact with the child protection system with or without the experience of out-of-home-care, very clearly identifies that this group is many times more at risk of a mental health condition than children who have not experienced adversity. This mirrors the experience of senior mental health clinicians; many of the most severe and complex cases, including those who self-harm on multiple occasions and who are chronically suicidal, usually have extensive histories of highly prejudicial adverse childhood experiences. In this respect the majority of children in the child protection system warrant a mental health intervention. This is clearly impractical given the resources of the mental health system.

In terms of acute interventions child protection services should refer young people who they hold strong concerns for:

- Because the consumer has expressed suicidal ideation or who have attempted suicide.
- The determination of a need for an assessment by CAMHS is made stronger by the number of ACEs experienced by the child and the number of dislocations they have had in their life.

A key process is the development of a strong caring relationship between caseworker and consumer.

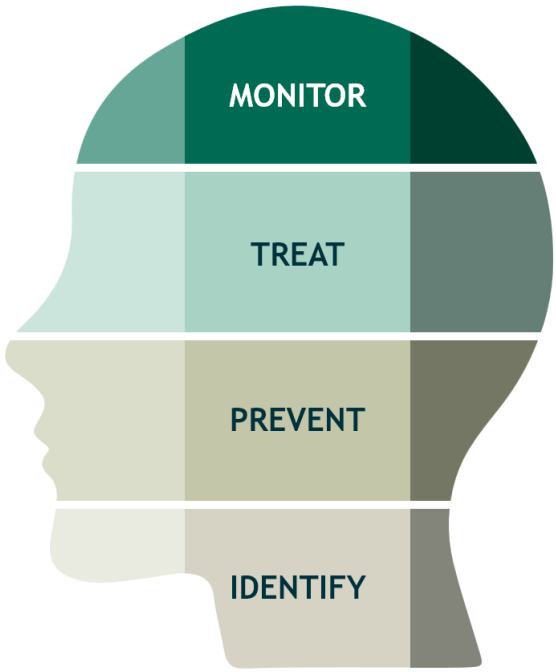
- This can only be achieved through stability of caseload and geographic proximity of the worker and consumer.
- A powerful indication of worsening mental health is when there is objective evidence of change; the young person becomes more socially withdrawn and isolated and does not attend to their usual daily activities.
- This significant change from normal behaviour can only be identified if the caseworker knows the general level of functioning and connectedness of the consumer.

Red flag behaviours for child protection services:

- are the same as for CAMHS.
- One behaviour that is infrequently the aim of research but resonates with clinicians and case workers experience is the sudden and often powerful despair felt by maltreated children when a key attachment figure (e.g., their biological mother) briefly returns to the individual's life and then quickly again becomes unavailable because of the return of mental illness, substance abuse or a recurrence of emotionally neglectful behaviour.

10

PRIORITY AREAS TO REDUCE PRESENT AND FUTURE SUICIDE



Suggestions for priority areas to reduce present and future risk of suicide in highly vulnerable infants, children and young people.

10.1 Shared understanding of the acute and long-term effects of adverse childhood experiences across all services that have dealings with children and families

- Different versions of knowledge about the effect of ACEs including in the population of children in care exist across all organisations that primarily deal with children (education, child protection, paediatrics, child and youth mental health, juvenile justice). All organisations have areas of strength and deficits. All could benefit from accepting one framework that summarises this information, inclusive of recent significant developments.
- Ideally this shared understanding and developed framework should be created by a working group that includes representatives from all relevant organisations.

10.2 Shared professional education and training about the acute and long-term effects of adverse childhood experiences across all services that have dealings with children and families

- Following on directly from point 10.1, a shared professional development program should be created with the aim of disseminating this new shared framework.
- A shared education program would have tiers based on the degree of clinical knowledge required for. For example:
    - Entry level professional development; would be provided during orientation and yearly updates to workers in youth detention and other juvenile justice settings. Department of education teaching staff would also benefit from level one information.
    - Level two professional development; would be applicable to many Department of Child Safety case managers. It would involve more detailed information about psychosocial outcomes, identifying individuals at risk and undertaking a suicide assessment.
    - Level three professional development would be for generic CAMHS clinicians, guidance offices and others with a more clinical role.
    - Level four professional development would be for clinicians in specialist teams such as Evolve Therapeutic Services.
- Ideally this shared professional development program should be created by a working group that includes representatives from all relevant organisations.

10.3 Engage in a process of cultural change that increases intersectoral collaboration

One purpose of the development of a shared framework (point 10.1) and shared professional education program (point 10.2) is to facilitate intersectoral collaboration. Given intersectoral collaboration is clearly in the best interest of the child numerous other opportunities should be undertaken to embed this culture across services. Initiatives could include:

- Embedding this construct and its benefits in all policy documents
- Embedding in the created shared framework
- Embedding in the created professional development program
- Including in job descriptions
- And in business practices.

Whilst all these initiatives will have benefit, the most important reform would be developing a culture of regular meetings between managers and clinicians across services.

10.4 Investment in creating Queensland data that can be rapidly provided to agencies

Australian practitioners have considerable competence in collecting and analysing large datasets. This expertise is rich in Queensland including initiatives like the Mater University Study of Pregnancy (https://social-science.uq.edu.au>Mater-University). Of the ~200 publications cited in this report very few were from Queensland. Given all services mentioned see children who have ACEs there is the potential for major reforms in the way data about this group is collected analysed and reported. Initiatives could include:

- Increased availability of administrative datasets to investigators with the benefit of creating new local knowledge.
- Generating Queensland prevalence rates for mental health and physical morbidity in maltreated children that can be monitored over time.
- Timely investigation of trends identified by clinicians and service providers. Two examples of phenomena that it would be useful to monitor have been provided in this report; the significant increases in youth attending Accident and Emergency Departments because of mental health challenges and including deliberate self-harm (empirical evidence), and the increase in hanging as the suicide method of choice by girls (anecdotal evidence).

Importantly data related reforms do not require the creation of a new measurement burden on consumers or workers. Rather, in the first instance existing forms could be adapted to facilitate data extraction along with fulfilling the purpose of the form. For example, simple changes to checklist forms of activities to be undertaken after a suicide attempt or critical incident assessment (e.g., format into easier to read tables, and/or inclusion of 'tick box' options, and/or placing forms online) could promote data capture and once analysed create valuable insights. Finally, workers aware of collected data being used in a timely manner and the results of analysis impacting service provision is also a powerful step towards developing a culture of evaluation. This will be required if new service models are embraced.

10.5 Engage in a State and National conversation about new investment to expand services for infants and pre-school children and their carers

Australians have greatly benefited from 20 years of investment in youth mental health services. No similar investment has occurred for children with mental health presentations. The service system around intervening with parent and infants, and parent and preschool children is even less well funded. This is despite very robust evidence, including much of the biological evidence detailed in this report, that the damage inherent to adverse childhood experiences occurs early, at critical times of brain development. A significant

national investment in the early years would do much to mitigate the effects of adversity. Such a service system would include:

- Identification, assessment and when appropriate treatment of parents with mental health disorders which have impacts on their infant or preschool child's well-being. This service need is increased if the infant/pre-school child has experienced other adverse experiences in the domains of abuse or neglect.
- Identification, assessment and when appropriate treatment of parents with substance use disorders that have impacts on their infant or preschool child's well-being. This service need is increased if the infant/preschool child has experienced other adverse experiences in the domains of abuse or neglect.
- Assessment of infants and preschool children who are in the child protection system and who are currently demonstrating mental health challenges such as anxious avoidant attachment or reactive attachment disorder or significantly dysregulated behaviour involving eating, sleep or emotional or behavioural control.
- Assessment of infants and preschool children who are in the child protection system, with evidence of high numbers of ACEs (5+) and who would benefit from an intervention regardless of whether they were currently demonstrating mental health challenges.

Any service intervention with parents, infants and preschool children would follow the long establish principles of this work, some of which include:

- Working within the parent child dyad,
- Encouraging and modelling parent behaviours that promote secure attachment, diminishing abusive or neglectful behaviours and
- increasing social connections
- and mobilising strengths within the parent, family and friends, and local community.

10.6 Collaborate with Aboriginal and Torres Strait parents, relatives, children and other stakeholders to create new service models that engage Aboriginal and Torres Strait young people and their families

One theme of this report is the confluence of information from epidemiology, neuroscience and the child death review that demonstrates the disturbingly high rate of mental health and drug and alcohol presentations, self-harm and suicide in young people of Aboriginal and Torres Strait descent. Published research and information from the child death review also demonstrated these young people were often very hard to engage, and given this, rarely participated in available programs.

To continue our current service provision strategies is nonsensical; an example of doing the same thing over and over again and expecting a different outcome. As a matter of urgency, service providers need to collaborate with Indigenous elders, parents and community

members to create innovative models of care which lead to engagement of this consumer group. It is highly likely that such programs would have:

- strong links to country and Indigenous identity,
- would not be clinic based nor be based in a western tradition of language-based therapies.

It would clearly be advantageous if such services:

- were delivered by Aboriginal and Torres Strait Islander people
- start early in life to prevent the early initiation of substance use including chroming
- be mindful of challenges provided by other services and systems based in western traditions (e.g., traditional methods of education)
- were strengths based and not stigmatising
- did not lead to pathways that increased the chance of incarceration such as increased involvement of police with young people in residential care.

It would be of great benefit to Indigenous youth, parents and service providers in Australia as well as first Nations people elsewhere in the world if any new model of care was compared to more traditional approaches to clearly demonstrate effectiveness.

10.7 Consider Multisystemic therapy for consumers that currently do not have their needs met by CAMHS or Evolve Therapeutic services.

Similar to the complexity seen with many Aboriginal and Torres Strait Islander young people, there are non-Indigenous young people who also have very high ACE scores, are difficult to contain in the traditional school setting because of oppositional, defiant , violent and truant behaviour and who often initiate drug and alcohol use at an early age. This group also do not do well in the clinic setting and are unable to tolerate language-based strategies. At a very young age they can be engaged in play therapy but unfortunately do not often present early. Multisystemic therapy was created to service the needs of this hard to engage group. Given MST is being used in New Zealand and Western Australia, Queensland children would benefit from a formal review of Australasian working examples of MST including any evidence of the effectiveness of these models.

11

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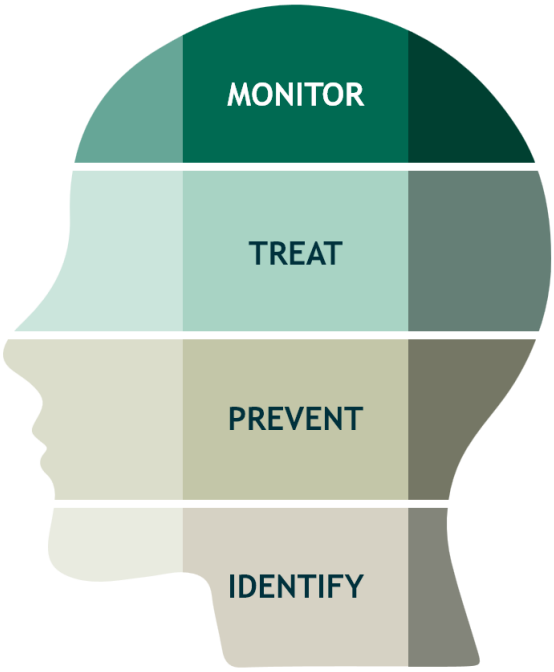

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