



EARLY
INTERVENTION
FOUNDATION

ADVERSE CHILDHOOD
EXPERIENCES: WHAT WE KNOW,
WHAT WE DON'T KNOW, AND
WHAT SHOULD HAPPEN NEXT

SUMMARY

Adverse childhood experiences

What we know,
what we don't know,
and what should
happen next

February 2020

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About EIF

The Early Intervention Foundation (EIF) is an independent charity established in 2013 to champion and support the use of effective early intervention to improve the lives of children and young people at risk of experiencing poor outcomes.

Effective early intervention works to prevent problems occurring, or to tackle them head-on when they do, before problems get worse. It also helps to foster a whole set of personal strengths and skills that prepare a child for adult life.

EIF is a research charity, focused on promoting and enabling an evidence-based approach to early intervention. Our work focuses on the developmental issues that can arise during a child's life, from birth to the age of 18, including their physical, cognitive, behavioural and social and emotional development. As a result, our work covers a wide range of policy and service areas, including health, education, families and policing.

EIF IS PROUD TO BE A MEMBER OF
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Summary

Adverse childhood experiences: What we know, what we don't know, and what should happen next

1

Research into adverse childhood experiences (ACEs) has generated a powerful and accessible narrative which has helpfully increased awareness of the lifetime impact of early adversity on children's outcomes.

Research into ACEs consistently shows that a set of 10 adverse experiences in childhood are associated with an increased risk of poor health and other problems in later life. This consistent and compelling evidence has brought greater focus from a wide range of policy-makers and public services on the harm caused by child abuse, neglect and other adversities. However, this ACEs narrative has increasingly dominated the debate about the role of public services in preventing and responding to childhood experiences of trauma. It has resulted in several misconceptions which must be addressed as the ACE agenda is taken forward.

2

The current popularity of the ACE narrative should not lead us to ignore the limitations in the current evidence base or be allowed to create the illusion that there are quick fixes to prevent adversity or to help people overcome it.

It is essential that children's policy and services respond to the fact that understanding, measuring and assessing need is complex, as is responding effectively to complex social problems. We urge caution on the ACE agenda given that:

- **Current estimates of the prevalence of ACEs are imprecise.** Although we know that childhood adversities and vulnerabilities are prevalent, we do not know *how* prevalent. For example, people are not always able to accurately recall whether they have experienced adversities, such as abuse, in childhood.
- **Good data on the prevalence of childhood adversity and wider risk factors is lacking.** More accurate estimates are essential for understanding the scale of childhood adversity, in order to plan services and to ensure that effective interventions are available for the children and families who most need them.
- **A focus on the original 10 ACEs to the exclusion of other factors risks missing people who also need help.** Many other negative circumstances in childhood are also associated with poor adult outcomes. These circumstances include economic disadvantage, discrimination, peer victimisation, low birth weight and child disability. For example, studies show that low family income may be a stronger predictor of poor physical health outcomes than many of the original ACE categories.
- **ACEs do not occur in isolation.** While ACEs occur across society, they are far more prevalent among those who are poor, isolated or living in deprived circumstances. These social inequalities not only increase the likelihood of ACEs, but also amplify their negative impact. This means that structural inequalities must be addressed for ACE-related policies, services and interventions to have any meaningful effect.

- **The evidence raises serious concerns about the ethics of some ACE screening practices.** ACE screening (including routine enquiry) is increasingly being used to identify children with symptoms of trauma, as a result of current or recent adversity. However, a number of major questions remain. Few evaluations to date have rigorously considered whether ACE screening is an effective method for identifying vulnerable children and making treatment decisions. We do not know whether ACE screening activities could inadvertently retraumatise children or cause other forms of harm. Serious concerns have been raised about whether some ACE screening practices are ethical in the absence of referral to effective treatments. And we should also recognise that such screening tools are unlikely to be a substitute for empathetic conversations by skilled and supervised practitioners.
- **Trauma-informed care has the potential to improve the quality of practice, but caution should be used in considering it to be a sufficient response to the complex problems of childhood adversity.** Governments and public agencies have invested in trauma-informed care as a way of increasing practitioner awareness of the effects of early trauma. However, what constitutes trauma-informed care is not well defined and current practice is highly varied across different settings. There is also limited robust UK evidence that demonstrates it improves outcomes for children. Further specification and testing are needed to fully understand its benefits for children who have experienced adversity.

3

The current enthusiasm for tackling ACEs should be channelled into creating comprehensive public health approaches in local communities, built on the evidence of what works to improve outcomes for children.

The original ACE study concluded that comprehensive strategies, involving universal, selected and targeted interventions were necessary to prevent and reduce ACEs. We agree with this position, but believe this must be part of a wider, whole-system approach.

WHAT WOULD A GOOD PUBLIC HEALTH APPROACH LOOK LIKE?

Tackling the conditions in which ACEs are more prevalent. National and local policies have a critical role to play in addressing wider social and economic conditions that can increase the likelihood of children being exposed to early adversity. This would include a focus on factors such as poverty and community crime, which negatively impact children's development and are associated with ACEs.

Improving the strength of national and local systems for preventing childhood adversity and providing support to the families and children who are the most vulnerable. The magnitude of the scale and impact of childhood adversity means that a response cannot be provided by a single service or intervention. An appropriate response instead requires a system-wide focus on the negative impact of childhood adversity, with workforce practice, services, commissioning and leadership all aligned in a commitment to identifying and meeting the needs of the most vulnerable families. This should include:

- Effective leadership, which ensures that services are well configured and connected to meet the needs of the local population.
- Strong professional workforces, who are equipped to meet the needs of children and families struggling with adversity. This support should include training and supervision, as well as the time necessary to establish positive relationships with families.
- Strong services, which includes the use of interventions with good evidence of improving outcomes for children. We have identified 33 interventions representing 10 intervention models with robust evidence of preventing ACEs, reducing the health-harming behaviours associated with ACEs, or reducing ACE-related trauma.

Significant investment into research on childhood adversity. This would include addressing the evidence gaps identified in this report and the rigorous evaluation of a comprehensive public health response to tackling adversity.

Introduction to ACEs

Adverse childhood experiences (ACEs) are traditionally understood as a set of 10 traumatic events or circumstances occurring before the age of 18 that have been shown through research to increase the risk of adult mental health problems and debilitating diseases. Five ACE categories are forms of child abuse and neglect, which are known to harm children and are punishable by law, and five represent forms of family dysfunction that increase children's exposure to trauma.

What are the 10 ACEs?

The 10 original ACEs are:

- physical abuse
- sexual abuse
- psychological abuse
- physical neglect
- psychological neglect
- witnessing domestic abuse
- having a close family member who misused drugs or alcohol
- having a close family member with mental health problems
- having a close family member who served time in prison
- parental separation or divorce on account of relationship breakdown.

The fact that ACEs are harmful should be sufficient reason for implementing strategies to stop and prevent them. However, consistent evidence showing that ACEs also predict poor adult outcomes has made the need for these strategies even more compelling.

For these reasons, the topic of ACEs has increasingly dominated public health debates about how frontline services can respond to instances of childhood adversity and prevent the circumstances which contribute to them. Common frontline activities include trauma-informed care, which aims to increase practitioners' awareness of the negative impact of trauma, so that they can reduce any trauma individuals might inadvertently experience through routine services. Universal ACE screening is also used by many frontline agencies to increase public awareness of childhood adversity and to help individuals access appropriate support. In some cases, this screening is used to produce an 'ACE score', which reflects the number of ACEs experienced before the age of 18.

Over the past five years, governments have increased their investment in these activities with the aim of preventing or reducing ACEs at the population level. For example, the US state of California has recently committed \$95 million to implement state-wide ACE screening through GP services. In the UK, the Welsh, Scottish and Northern Ireland governments are implementing training in trauma-informed care for a wide variety of frontline workforces.

In 2018, a House of Commons science and technology committee inquiry was held to examine the evidence linking ACEs to poor adult outcomes, and to consider the role of early intervention in preventing and reducing ACEs. The inquiry took evidence from a range of experts and organisations, including EIF. While there was strong consensus that ACEs were harmful and associated with a range of negative adult outcomes, there was also scepticism about the strength of this relationship and the extent to which current practice responses, including routine ACE screening, are effective or appropriate.

The committee concluded that there was ‘a clear correlation between suffering adversity in childhood and experiencing further negative outcomes in later life’ and recommended that the government ‘ensure that it is making the most of the opportunity for early intervention to effectively and cost-effectively address childhood adversity and trauma, and the long-term problems associated with such experiences’. Additionally, the committee advised that progress could only be made if there was clear and robust evidence about the nature of ACEs and their impact on children’s development. The committee report also encouraged joined-up working across academic fields to develop this evidence base.

Aims of the review

A primary aim of this review is to respond to the science and technology committee’s recommendations by examining the ACE evidence base in terms of its quality and the conclusions which have followed. A second aim is to consider the strength of evidence underpinning common responses to ACEs, including routine ACE screening and trauma-informed care. In doing so, this report will answer the following questions:

- What do we know about the 10 original ACE categories in terms of their prevalence and co-occurring risks?
- How robust are the methodologies used to investigate ACEs? Are there other methods which may be more appropriate?
- How strong is the evidence linking ACEs to negative adult outcomes? To what extent has a causal relationship been established?
- What biological and social processes link ACEs to negative adult outcomes? Is knowledge of these processes adequate to inform the design and provision of effective interventions and services?
- What do we know about the effectiveness of common responses to ACEs, including routine ACE screening and trauma-informed care? What is the effectiveness of other kinds of interventions and what is their combined potential for preventing and reducing ACEs?

Methodology

Hand-search methods involving indexed journals were used to identify the most recent research on ACEs, as well as child maltreatment and family dysfunction more generally. These methods included:

- a review of the findings from ACE studies, as well as child maltreatment prevalence studies conducted in the UK and US since the mid-1980s
- a review of the evaluation evidence considering the feasibility of routine ACE screening and trauma-informed care, and their impact in reducing child trauma and improving family outcomes
- evidence gathered from the EIF Guidebook about interventions which aim to either prevent ACEs from occurring in the first place or respond to ACE-related trauma
- interviews with representatives from Public Health England, Wales and Scotland, prominent children’s charities, independent health organisations and academics.

What do we know about the prevalence of ACEs and their co-occurring risks?

It is clear that ACEs are prevalent. Case in point: over 80% of the 399,500 children who were identified as being in need in England last year had experienced at least one ACE. This means that at least 2.5% of all children living in England are experiencing some form of maltreatment or family dysfunction at any given point in time. We also know that this statistic reflects only the tip of the iceberg, since the majority of child maltreatment cases go unreported.

Retrospective surveys with adults, by contrast, inform us that at least 10% will have experienced some form of abuse during their childhood. They also tell us that 10% or more of the population will have experienced four or more ACEs before the age of 18. However, these findings do not show us the extent to which these reports overlap – are they the same 10% or do they represent different vulnerable groups? – nor do we know much about other risks these groups of children might be experiencing.

It is also clear that ACEs occur in clusters and do so in predictable ways. If a child is experiencing physical abuse, they are at far greater risk of experiencing psychological abuse, as well as witnessing domestic violence. However, we know extremely little about the prevalence of these various clusters. While 10–15% of the population may have experienced four or more adverse experiences during their childhood, we do not know the number of children exposed to high levels of abuse and family conflict because they are raised in households with multiple adversities, in comparison to those who are chronically neglected because one parent had a mental health problem and the other lived far away. While both sets of circumstances increase the risk of negative adult outcomes, the number of children existing within each of these clusters remains unknown.

Despite the frequency of ACEs, it is clear that a significant proportion of adults will report experiencing very few or no ACEs. This is good news, but it creates challenges for identifying the children who are most likely to benefit from effective interventions.

We therefore need to improve our estimates of the prevalence of ACEs, so we know who the most vulnerable children are and can make interventions available to them as and when needed.

How robust are the methodologies used to investigate ACEs? Are there other methods which may be more appropriate?

Collecting accurate information about child maltreatment and associated risks is extremely difficult. This is because caregivers are reluctant to report abuse for fear of criminal prosecution, and adults are often poor at recalling experiences of abuse. This means that much of what we know about ACEs may either under- or overestimate the scale of the problem.

Four methods are commonly used to collect information about child maltreatment and other forms of family dysfunction.

- **Service records** consist of information routinely collected by frontline services. Such records provide accurate information about service use related to abuse, neglect and other family adversities. However, given that most abuse and neglect is unreported, service records systematically underestimate the number of children with a history of child maltreatment and other ACEs.

- **Prospective cohort studies** make use of longitudinal designs, whereby a large, representative sample of families with children born in the same year are tracked at regular intervals, typically starting in the year of the child's birth and continuing until at least their 18th birthday. These studies provide the most robust method of understanding the potential relationship between childhood experiences and later adult outcomes. However, they take a long time to complete and are also prone to bias in terms of under-reporting.
- **Retrospective cross-sectional surveys** involve asking a representative sample of adults to recall their childhood experiences of ACEs. The majority of ACE studies are conducted in this manner, with the advantage being that experiences of abuse and neglect are in the past, and there is lower risk of prosecution ensuing. However, studies repeatedly show that adults can have difficulty remembering their experiences of abuse, suggesting that their memories are highly influenced by their current circumstances. This means that retrospective studies can both under- and overestimate the prevalence of ACEs in ways which are not fully known.
- **Concurrent cross-sectional surveys** involve asking a cross-section of children and parents (with children under the age of 10) to report their adverse experiences. This methodology overcomes many of the recall biases inherent in retrospective designs, as computer-assisted methodologies are used to help children (and parents of children) report on events that have occurred in the recent past. Concurrent surveys can be further strengthened through anonymous linking to administrative service records, which has the advantage of allowing survey findings to be compared to outcomes occurring after the timescale of the initial study. As a result, concurrent surveys are useful for measuring change in prevalence over time, as well as considering the longitudinal impact of various adversities. Concurrent surveys with children must nevertheless be conducted within rigorously enforced ethics protocols, which balance the participant's right to confidentiality, while at the same time ensuring that experiences of abuse and neglect are investigated if they are disclosed.

The Office for National Statistics is currently considering the feasibility of conducting another comprehensive prevalence survey. **Given that robust population-surveillance data is essential for designing and targeting effective interventions, we recommend that methods be introduced which permit concurrent ACE surveys to be conducted with children at the national level on a regular basis.**

How strong is the evidence linking ACEs to negative adult outcomes? To what extent has a causal relationship been established?

Over the past 20 years, ACE studies consistently confirm that the greater the number of ACEs experienced before the age of 18, the greater the chance of poor adult outcomes. The strength of this 'dose-response' relationship varies, however, depending on the adult outcome under investigation. Findings from a recent systematic review of all ACE studies completed since 1998, for instance, observed that experiencing four or more ACEs, in comparison to experiencing no ACEs, typically:

- doubles the risk¹ of obesity, physical inactivity and diabetes
- triples the risk of smoking, cancer, heart disease or respiratory disease

¹ The term 'risk' is used to reflect a relative increase in risk, as calculated by a risk ratio or adjusted odds ratio – see Dicker, R. C., Coronado, F., Koo, D., & Parrish, R. G. (2006). *Principles of epidemiology in public health practice*, 3rd edition.

- quadruples the risk of sexual risk-taking, mental health problems and problematic alcohol use
- increases the risk of problematic drug use and interpersonal and self-directed violence by seven-fold.

It is clear that high levels of adverse experiences occurring in childhood significantly increase the chances of a number of negative outcomes in adulthood. However, it is important to note that the *absolute size* of many of these risks remains relatively small. For example, the original ACE study observed that four or more ACEs increases the risk of intravenous drug use by 10-fold. This is based on findings showing that 0.3% of those with a history of no ACEs engaged in intravenous drug use, in comparison with 3.5% of those with four or more ACEs. Nevertheless, 96.5% of those who had experienced four or more ACEs *did not* use drugs intravenously, demonstrating that while significant, the relationship between ACEs and intravenous drug use is not deterministic.

More broadly, these findings show that the relationship between ACEs and risky sexual behaviour, mental health problems and problematic substance misuse is strong in comparison to the relationship with physical health outcomes. Moreover, studies also show that the relationship between ACEs and poor physical health weakens considerably when more robust, prospective study designs are used and when other negative childhood circumstances, such as economic disadvantage, are statistically considered.

There is also strong evidence that other negative childhood circumstances, which covary with the 10 traditionally defined ACEs, predict negative adult health outcomes. For example:

- low birth weight has been found to increase the risk of having a stroke before the age of 50 by 200%
- a childhood disability increases the risk of problematic drinking in adults by over 80%
- bullying during the teenage years increases the risk of an adult mental health problem by more than 50%
- childhood experiences of social discrimination have been found to increase the risk of adult mental health problems by over 200%.

Additionally, studies show that low family income may be a stronger predictor of some physical health outcomes than many of the traditional ACE categories. For example, findings from a recent US survey conducted concurrently with teenagers observed that family income was, in fact, more strongly associated with poor physical health in adulthood than all of the ACE categories with the exception of having a family member with a mental health problem.

Collectively, these findings suggest that the graded relationship observed between ACEs and negative physical outcomes is not as strong as the relationship between ACEs and negative mental health outcomes. The implication is that prevention efforts targeting ACEs may help to reduce mental health problems, but may have less impact on physical health outcomes.

These findings additionally show that ACEs are not the only contributor to poor adult outcomes and that a variety of other negative childhood circumstances also significantly predict poor physical and mental health. An unintended consequence is that an over-reliance on the original ACE categories could obscure or minimise our understanding of the impact of other childhood adversities. **Future population studies should look beyond the original ACE categories to consider the combined impact of multiple negative childhood circumstances on adult outcomes, ideally through prospective study designs involving large, representative samples.**

What are the biological and social processes which potentially link ACEs to negative adult outcomes? Is knowledge of these processes sufficient to inform the design and provision of effective interventions?

The ACE study authors originally assumed that the link between ACEs and negative adult outcomes could be explained by increases in health-harming behaviours that were used by teenagers and young adults to cope with higher levels of trauma-related stress. Indeed, the first ACE study observed that a history of four or more ACEs more than doubled the risk of smoking, quadrupled the risk of intravenous drug use, and increased the risks of problematic drinking by seven-fold and intravenous drug use by 10-fold. The findings therefore supported the conclusion that four or more ACEs increased the risk of health-harming behaviours, which in turn reduced individuals' resistance to life-threatening diseases.

Subsequent studies involving more rigorous, prospective designs, have confirmed these findings. However, these studies also find that health-harming behaviours typically explain only half of the statistical relationship between ACEs and poor physical outcomes, meaning that other processes are also involved. A number of complementary theoretical accounts have therefore been proposed to explain how ACEs might impact children's physical and mental health. Accounts focusing on toxic stress, latent vulnerability and epigenetic modulation are particularly well known.

- **Toxic stress** has been defined as an extreme form of stress that occurs when individuals are exposed to high levels of adversity and trauma on an ongoing basis. In these situations, increases in stress can result in the overproduction of cortisol in a way that potentially damages important physiological systems. Preliminary findings from studies conducted with animals and children suggest that this damage may include disruptions to the neural networks which govern the development of the autoimmune system, as well as regions of the brain responsible for memory. Over time, these disruptions may weaken the immune system, decreasing children's resilience to disease and negatively impacting their ability to manage their stress response.
- Models of **latent vulnerability** consider how exposure to childhood maltreatment potentially alters brain functioning and information processing so that children are more vulnerable to mental health problems as they mature. Preliminary findings from brain-imaging studies suggest that abuse and neglect may lead to adaptations or 'calibrations' in a range of neurocognitive systems, including those which govern threat processing, reward processing and autobiographical memory processing. While these calibrations may be beneficial for coping within adverse environments, studies show they may also increase children's susceptibility to anxiety and other mental health problems in later life.
- **Epigenetic modulation** considers how environmental experiences contribute to changes in the expression of the genetic code. Support for epigenetic modulation in response to stress comes from rat studies, which show that pups reared in low-nurturing environments have greater reactivity to stress than pups raised in high-nurturing environments. In particular, high levels of maternal licking after rat pups are stressed has been verified to trigger alterations in the genetic code which govern the pups' reactivity to stress. This increased reactivity may in fact be adaptive in the absence of a nurturing caregiving environment but may also reduce their resilience to disease by the time they reach adulthood.

While these three accounts provide some explanation of how ACEs potentially get 'beneath the skin' to negatively influence children's development, we must bear in mind that the evidence underpinning them is highly preliminary, and currently provides limited insight into how and when to intervene.

In the meantime, there is robust evidence for a number of social processes which link ACEs to negative adult outcomes. Examples of three social processes linking ACEs to poor adult outcomes include:

1. coercive family interactions, whereby aggressive and abusive behaviours are learned and reinforced
2. processes which increase children's vulnerability to polyvictimisation, through increased exposure to multiple forms of abuse perpetrated by peers and adults outside of the family home
3. a lack of positive social interactions with trusted peers and adults that support children's resilience by increasing their sense of self-worth and efficacy.

These social processes are complementary to the biological mechanisms described above, and there is robust experimental evidence showing that they are preventable and treatable. In the meantime, it makes sense **to increase the availability of interventions with known evidence of stopping and reducing the social mechanisms of ACEs, while neurobiological investigations continue.**

What is the potential of routine ACE screening and trauma-informed care for preventing and reducing ACE-related trauma? Are other effective interventions available and what is their combined potential for preventing and reducing ACEs?

When the ACE study was first published, the authors concluded that comprehensive strategies, involving universal, selected and targeted interventions, were necessary to prevent and reduce ACEs. These strategies included intensive home visiting interventions for vulnerable families, school-based programmes aimed at preventing health-harming behaviours, and targeted psychotherapeutic treatments designed to help children and parents cope with ACE-related trauma.

Unfortunately, this comprehensive package of evidence-based care is currently not in widespread use. Instead, governments and health agencies have invested more heavily in routine ACE screening activities and trauma-informed care.

Routine ACE screening

ACE screening, also referred to as routine enquiry, involves using items from the original ACE questionnaire to ask children and adults about their history of ACEs, frequently resulting in an 'ACE score'. This practice was informed by anecdotal evidence suggesting that the scores were useful in raising the patients' awareness of ACEs. It also provided a therapeutic opportunity for patients to discuss their previous adverse experiences with their healthcare providers.

A growing number of frontline service providers now routinely ask patients about their adverse childhood experiences to increase awareness about the impact of ACEs on their wellbeing and discuss options for further treatment if needed. Relatively few of these activities have been rigorously tested, however. What we do know from these studies is that while participants who have not experienced adversity don't mind being asked ACE questions, those experiencing high numbers of ACEs are less comfortable with such questions. Practitioner views are also mixed, with some viewing ACE scores as useful for initiating conversations about adversity, while others question the value of the practice in the absence of additional, evidence-based support.

Recently, the Child Trends Research Center in the US has identified a set of concerns they believe should be addressed before ACE screening is implemented more widely.

1. The accuracy and diagnostic sensitivity and specificity of ACE screening must be established. The tool has been criticised for not covering other important adversities that also increase children's exposure to trauma, while including categories which may be less significant for some children. We therefore do not yet know the extent to which the tool risks missing children who need support, while at the same time falsely identifying children who may not benefit from it. More needs to be known about the accuracy of ACE scores, and the appropriateness of various score cut-offs or thresholds, particularly for predicting need in differing age groups.
2. The extent to which experiences of adversity predict psychological symptoms, including those associated with trauma, is not fully understood. More also needs to be known about the extent to which the most vulnerable children and families find ACE screening to be acceptable.
3. We need to determine if ACE screening practices represent the most efficient way of understanding adversity, or if other methods of inquiry are better. For example, to what extent do ACE screening tools improve practice decisions over the information gained through empathetic conversations with trained and supervised practitioners? More rigorous testing is also required to determine that ACE screening does not inadvertently cause harm, stigmatisation or discrimination.
4. Guidelines for the implementation of ACE screening practices must be developed and tested. Currently, most ACE screening practices do not comply with the World Health Organization's standards for screening implementation.
5. Screening activities currently do not include protocols which ensure that a strengths-based approach, which considers ACEs within the context of factors which support children's resilience, is adopted.
6. ACE screening should be embedded in a care pathway leading to further, evidence-based intervention if needed. Screening in the absence of such pathways is otherwise considered by many to be unethical. In the UK, given that child and adolescent mental health services (CAMHS) and other mental health resources are stretched already, providing evidence-based support may currently be difficult.

Trauma-informed care

Trauma-informed care aims to reduce the stress associated with ACE-related trauma and increase children's resilience. The primary aim of trauma-informed care is to increase practitioners' awareness of how trauma negatively impacts children and adults, and to reduce practices that might inadvertently retraumatise clients. Trauma-informed care also aims to increase practitioners' sensitivity so that users perceive them to be trustworthy and feel safe to disclose traumatic experiences.

A wide range of activities are offered under the guise of trauma-informed care. These activities include training about the potential impact traumatic experiences can have on the immune and nervous systems, advice on how practitioners can form a more trusting relationship with individuals, and service redesigns which aim to create a sense of safety and increase client choice and control.

Various forms of trauma-informed care have undergone feasibility testing, and one randomised control trial has been completed in the US. Findings regarding the feasibility of trauma-informed care have been mixed, providing preliminary evidence of increased client satisfaction, improvements in children's symptoms of trauma and increased placement stability. However, it can also be expensive to implement, and concerns have been raised

about the lack of specificity in many trauma-informed care models. **Increased specification and further rigorous testing are therefore necessary before the potential of trauma-informed care for reducing symptoms of trauma can be fully understood.**

A comprehensive public health approach involving evidence-based early interventions

The first ACE study concluded with recommendations for adopting a comprehensive public health strategy involving evidence-based interventions that would be offered at the universal, selected and targeted levels. We conclude this report by doing the same.

In table S1, we provide the details of 33 interventions with current robust evidence of preventing at least one of the 10 original ACE categories, reducing the health-harming behaviours associated with ACEs, and specifically reducing ACE-related trauma. These activities represent 10 separate intervention models that can be offered at the universal, targeted selective and targeted indicated level. While this list is by no mean exhaustive, it includes a wide range of interventions with proven evidence to prevent or reduce the impact of ACEs at the population level if offered in combination. **We believe that if these evidence-based interventions were integrated into a comprehensive public health strategy developed in response to population needs, many ACEs could be prevented or substantially reduced.**

Although we recognise that these activities will not entirely eradicate ACEs, we believe that they represent a tested and feasible way of preventing and reducing them at the population level. Nevertheless, it is also clear that the effectiveness of these interventions will be limited unless they are embedded within public health policies which systematically address the wider societal determinants of health, including poverty, unemployment and discrimination.

TABLE S1

Interventions listed on the EIF Guidebook with robust evidence of preventing ACEs, reducing ACE-related symptoms or stopping the social mechanisms which contribute to ACEs

All interventions listed here have been assessed by EIF as having level 3 evidence or higher. Level 3 evidence is the threshold at which causality can be attributed to the intervention model through robust evaluation methods involving random assignment or similarly rigorous quasi-experimental designs. Level 4 evidence suggests that this evidence has been established in more than one study and that there is clear evidence of a long-term outcome. More information about the EIF Guidebook evidence standards can be found here: <https://guidebook.eif.org.uk/>

| Intervention name | Description | Age range (years unless stated) | Model | Outcomes | |
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| Universal screening | | | | | |
| Universal activities: Can be provided to all children and families, regardless of level of need. The impact of universal activities is primarily preventative. No screening or prereferral is necessary for children or parents to participate. | | | | | |
| Universal screening | | | | | |
| 1 | Perinatal mental health screening | Routine screening of mothers for mental health problems throughout pregnancy and the postpartum period. | Perinatal | Screening | 2–9% reductions, in the risk of depression at follow-up (3–5 months) after participation in programs involving depression screening, with or without additional treatment components, compared with usual care. A 34% reduction in remission in depression symptoms when screening leads to referral of CBT. |
| 2 | Domestic violence screening | Routine screening for intimate-partner violence during the antenatal period. | Perinatal | Screening | Routine antenatal screening for intimate partner violence has been found to increase mothers' safety and improve childbirth outcomes when combined with evidence-based therapies aimed at increasing mother and child safety. |
| Co-parenting interventions | | | | | |
| 3 | Family Foundations | A group-based programme for couples expecting their first child where couples learn strategies for enhancing their communication, conflict resolution and the sharing of childcare duties. The improvement in interparental relationships, in turn, improves child outcomes. | Perinatal | Group-based | Level 4 evidence of medium improvements in infant soothability ($d=0.35$ to $.47$), medium reductions in maternal symptoms of depression and anxiety ($d=.56$ and $d=.38$, respectively) and medium to large improvements in co-parenting behaviour and relationship satisfaction ($d=.47$ to $.7$) (Feinberg et al., 2008). Notably, significant reductions in interparental physical violence and parent-child psychological and physical violence were noted six months following intervention completion (Feinberg et al., 2015). |
| 4 | Schoolchildren and Their Families | A group-based programme for couples with a child entering primary school. Six couples attend 16 sessions of two hours' duration where they learn strategies for managing their child's behaviour and improving their co-parenting practices. | 3–5 | Group-based | Level 3 evidence of improved parenting behaviours, parental mood, and child behaviour, as well as reductions in marital conflict immediately after intervention completion. Improvements in couple communication and satisfaction and some child behaviours were observed at a 10-year follow-up. |

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| 5 | Strengthening Families 10 to 14 | A families-based programme that seeks to enhance family protective processes such as effective communication and child resistance to peer pressure as well as reduce family risk. | 10–14 | Family-based | Level 3 evidence of small ($d = .26$ to $.39$) reductions in alcohol initiation at 1- and 2-year follow-ups, respectively (Spoth et al., 1999) small ($d = .33$ and $.35$) reductions in aggressive behaviours at a four-year follow-up (Spoth et al., 2000), and significant improvements in academic success at a 6-year follow-up (Spoth et al., 2008). A 10-year follow-up additionally reported lower rates of substance use during sex, lower past year number of partners and lower lifetime sexually transmitted diseases (Spoth et al., 2014). |
| School-based interventions aimed at supporting children's social and emotional development and preventing health-harming behaviours | | | | | |
| 6 | ASSIST (A Stop Smoking in Schools Trial) | Influent students are recruited into a peer support programme where they are taught skills to dissuade their classmates from engaging in smoking in non-judgemental and empathic ways. | 12–14 | School-based | Level 3 evidence of a 79% reduction in smoking which was sustained at a two-year follow-up (Campbell et al., 2008). |
| 7 | Advanced Life-Skills Training | A schools-based curriculum which supports young people's personal self-efficacy and provides them with strategies for resisting tobacco, alcohol and illicit drug use. | 11–14 | School-based | Level 3+ evidence of a 23% reduction in self-reports of smoking, problematic drinking, marijuana use and illicit drug use at a five-year follow-up (Spoth, Randall, Trudeau, Shin, & Redmond, 2008). |
| 8 | Friends for Life (health led) | A schools-based curriculum which provides children with cognitive behavioural strategies for managing worrying behaviours and symptoms of anxiety. | 7–13 | School-based | Level 3 evidence of small reductions ($d = .22$) in reported symptoms of anxiety in low-risk children. No differences were found for high risk children (Stallard et al., 2014). |
| 9 | Friends for Youth | A school-based curriculum which uses workbook exercises, role plays, games, activities and quizzes, to help children to develop strategies for managing anxiety and stress. | 12–13 | School-based | Level 3 evidence of significant reductions in anxiety among young people receiving the intervention in comparison to those who did not. |
| 10 | Good Behaviour Game | A schools-based curriculum consisting of short team games designed to encourage prosocial behaviour and reduce disruptive behaviour. | 5–11 | School-based | Level 3+ evidence of reductions in aggressive and shy behaviour immediately post-intervention. Significant reductions in problematic drinking and antisocial behaviour, as well as a 50% reduction in suicide ideation were observed at a 14-year follow-up (Kellam et al., 2008; Wilcox et al., 2008). These findings have not been replicated in the UK, however (Ashworth et al., 2020). |
| 11 | Incredible Years Dinosaur Club | A programme delivered to small groups of children that uses coached play, videos and games to teach self-regulation and problem-solving skills. | 4–8 | Group-based | Level 3+ evidence of improvements in behaviour at home, at school and with peers and in social competence with peers for those who received the intervention, relative to those who did not (Webster-Stratton & Hammond, 1997). |
| 12 | Lion's Quest Skills for Adolescent Behaviours | A schools-based curriculum aimed at teaching cognitive-behavioural skills for building self-esteem and personal responsibility, making better decisions, resisting social influences, and increasing knowledge with regards to drug use and consequences. This is taught using a combination of role play, group work and discussion. | 11–14 | School-based | Level 3 evidence of 3% and 2.5% reduced lifetime and recent marijuana use, respectively, amongst those who received the intervention relative to those who did not at a one-year follow up (Eisen et al., 2003). |

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| 13 | PATHS Preschool | A schools-based curriculum promoting emotional and social competencies and reducing aggression and behaviour problems in preschool children. | 3–6 | School-based | Level 3+ evidence of small improvements in work-related skills, social problem-solving skills and knowledge of emotions (d= .17, d=.14 and d=.13, respectively) immediately post intervention (Morris et al., 2014). |
| 14 | PATHS Elementary | A schools-based curriculum promoting emotional and social competencies and reducing aggression and behaviour problems in elementary children. | 6–12 | School-based | Level 3 evidence from multiple studies showing small to moderate reductions in child behaviour problems, including those associated with bullying lasting for at least two years (Malti, Ribeaud & Eisner, 2011; Ruby & Doolittle, 2010). |
| 15 | Positive Action | A schools-based social and emotional learning curriculum delivered through role-play, puppets, stories and activity sheets. | 4–15 | School-based | Level 3 evidence of a 31% reduction in substance use behaviour and a 36% reduction in violent behaviour after the intervention had been delivered for approximately 3 years (Li, K.-K., et al., 2011). |
| 16 | Olweus Bullying Program | A whole-school approach to bullying prevention, involving staff, students, parents, and the community in prevention efforts. For instance, staff receive training on how to intervene when bullying occurs and students receive class meetings focused on bullying prevention, peer relations, and pro-social behaviours. | 5–18 | School-based | Evidence of small to large reductions (d= -.4 to d= 1.9) in reports of being bullied in grades 3 to 10 and moderate to large reductions (d=.76 to d=1.33) in reports of bullying others in grades 4 to 11 (Limber et al., 2018 and Olweus et al., 1991) as well as reduced antisocial behaviour and improved wellbeing and satisfaction with school life (Olweus et al., 2004). |

Selective interventions made available to families on the basis of selected demographic risks

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| 17 | Family Nurse Partnership | FNP is a preventative home-visiting intervention for first-time teenage mothers and their children. Home visits begin from the time of the mother's first booking and then last until the child's second birthday. | Antenatal to age 2 | Home visiting | FNP has level 4 evidence of improving a variety of child and maternal outcomes from multiple RCTs conducted in North America, Europe and the UK. Findings from a recently completed Dutch trial has specific implications for ACEs, showing a 91% decreased rate of child maltreatment, a 51% reduction in toddler internalising symptoms at age 2 and significant reductions in a variety of forms of domestic violence throughout the duration of the programme. These findings have not been replicated in the UK, however (Robling, Becker, & Butler, 2016). |
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Targeted interventions made available to children and parents on the basis of a pre-identified need

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| Parenting interventions | | | | | |
| 18 | Empowering Parents/ Empowering Communities (EPEC) | A parenting intervention for disadvantaged families experiencing behavioural difficulties with a child between the ages of two and 11. | 2–11 | Group-based | Level 3 evidence of moderate reductions in coercive parenting behaviours (effect size = .69), alongside small reductions in problematic child behaviours (effect size = .39). |
| 19 | Level 4 Triple P Group & Standard | Enhanced Triple P (level 5) provides adjunctive interventions (alongside a level 4 Triple P programme) to address family factors that may complicate the task of parenting, such as parental mood and partner conflict. | 2–5 | Individual therapy | Level 3 evidence of significant reductions in coercive parenting behaviours and increasing parenting competence, as well as significant improvements in child behaviour, lasting for over three years (Sanders, Bor & Morawska, 2007). |

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| 20 | Family Check-up for Children | A family-centred intervention that teaches parents to use parenting practices to support child competence, mental health and risk reduction. | 2–5 | Home visiting | Level 3 evidence from multiple studies of a reduction in aggressive and destructive behaviour sustained at the 1-year follow-up (Shaw et al., 2006). Additional benefits include improved parent-child interaction and reduced maternal depression (Shaw et al., 2008, 2009; Lukenheimer, 2008; Dishion et al., 2014). |
| 21 | Helping the Non-Compliant Child | An intervention that targets parents and their children where they learn how to manage unwanted child behaviour. | 3–8 | Individual therapy | Level 3 evidence of reductions in symptoms of ADHD and improvements in behaviour amongst children who received the intervention, relative to those who did not (Abikoff et al., 2015). |
| 22 | Hitkashrut | A co-parent training intervention aimed at reshaping parent-child interactions to reduce conduct problems. | 3–5 | Group-based | Level 3 evidence of a medium (d= .76) reduction in conduct problems immediately following the intervention, maintained at the 1-year follow-up (d= .63). Additionally, there were large (d= .85) and medium (d= .47) improvements in effortful control and callous/unemotional traits, respectively, maintained at the 1-year follow-up (Somech et al., 2012). Additionally, parents reported improvements in their marital quality and parenting behaviours (Somech et al., 2016). |
| 23 | The Incredible Years Preschool Basic | A group parenting programme where parents learn strategies for interacting positively with their child and discouraging unwanted behaviour through mediated video vignettes, problem-solving exercises and structured practice activities. | 3–6 | Group-based | Level 4 evidence of medium to large (d= .63 and d= .89) reductions in number and intensity of conduct problems, respectively (Hutchings et al., 2007). This has been replicated in additional evaluations which identified medium improvements (d= .31 to d=.75) in child behavior (Scott et al., 2001; Gardener & Klimes, 2006) immediately following completion of the intervention as well as improvements in behavior and reading at 4 to 10 years post-intervention (Scott et al., 2014). |
| 24 | The Incredible Years School Age Basic | A group parenting programme that teaches effective parenting strategies for dealing with unwanted behaviour through group discussion, role plays, video vignettes and homework. | 6–12 | Group-based | Level 3+ evidence of a medium reduction (d=.52 and d=.44) in conduct problems and ADHD symptoms, respectively, and a halving of diagnosis of oppositional defiant disorder at a four-month follow-up (Scott et al., 2010). Additional parental outcomes included increased use of play, praise and rewards and time out and reduced harsh discipline (d=.31 to d=.59). Another level 3 evaluation (Webster-Stratton et al., 2004) identified small to medium reductions (d=.35 to d=.67) in conduct problems at home and at school as well as a large (d=.81) reduction in negative parenting and a medium (d=.51) increase in positive parenting by mothers. |
| Interventions for families where the parents are separating | | | | | |
| 25 | Family Transitions Triple P | Family Transitions Triple P (FTTP) is an intensive intervention that aims to prevent adverse outcomes for children following parental divorce. It can be delivered individually to families or as a group-based intervention. | 2–18 | Individual or group-based | Level 3 evidence of significant reductions in child behavior problems and coercive parenting behaviours in the first year and improved parental mood and co-parenting skills at the one-year follow-up. |
| 26 | New Beginnings | A group-based intervention for separating parents that aims to improve young people's internalising and externalising problems by teaching parents strategies for improving positive family communication and effective discipline. | 3–18 | Group-based | Evidence of a reduction in externalising and internalising problems when examined immediately after the intervention (Wolchik et al., 2000). Similar results were identified at the six-month follow-up with respect to externalising behaviour while at the 15-year follow up there was a reduction in the development of the internalising problems. |

| Therapeutic interventions | | | | | | |
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| 27 | Trauma-focused Cognitive Behavioural Therapy | A therapeutic intervention for children and families where participants learn cognitive strategies for managing negative emotions and beliefs stemming from highly distressing and/or abusive experiences. | 2–18 | Individual therapy | Level 3 evidence from multiple studies suggesting reductions moderate to strong reductions in symptoms of PTSD, anxiety and depression. | |
| 28 | Multidimensional Family Therapy | An integrated therapeutic intervention for adolescents and families that also includes an optional community-focused component. It aims to develop problem-solving skills for dealing with issues that are occurring at the level of the adolescent, parent, family and community. | 10–18 | Individual therapy | Level 4 evidence of reductions in externalising symptoms and cannabis dependence symptoms at a nine-month follow-up (Rigter et al., 2013 and Schaub et al., 2014). Additionally, at a 12-month follow-up there is evidence of moderate reductions in substance use problems severity ($d = .59$) and increases in drug abstinence as well as reductions in delinquency, externalising symptoms and felony arrests at an 18-month follow-up (Dakof et al., 2015). | |
| 29 | Child-Parent Psychotherapy | A therapeutic intervention targeting mothers and preschool children who may have experienced trauma or abuse (e.g. domestic violence) or are otherwise at risk of behavioural and emotional problems. | 3–5 | Individual therapy | Level 3 evidence from multiple studies of medium reductions in symptoms of child trauma (effect size = .63) and small improvements in child behaviour ($d = .24$). Maternal benefits included medium reductions (average $d = .40$) in maternal reports of trauma (Lieberman, Van Horn, & Ippen, 2005). | |
| 30 | Child First | A 12-month home-visiting intervention combining Child-Parent Psychotherapy with other forms of social support to reduce the risk of child maltreatment in vulnerable families with young children. | 6–36 months | Home-visiting | Level 3 evidence of four-fold reductions in child behavioural problems and a two-fold reduction in reports of child maltreatment at a three-year follow-up. Also, a three-fold reduction in parenting stress and four-fold reduction in symptoms of psychopathology at a 12-month follow-up (Lowell, Carter, Godoy, Paulicin, & Brigg-Gowan, 2011). | |
| Specialist interventions offered as alternatives to families with a child at the edge of going into care | | | | | | |
| 31 | Functional Family Therapy | A therapeutic intervention for young people involved in serious antisocial behaviour and/or substance misuse and their parents. Participants are taught behavioural strategies and skills including listening skills, anger management and parental supervision techniques to replace maladaptive behaviours (i.e. antisocial behaviour and substance abuse). | 10–18 | Individual & family therapy | Level 3 evidence from multiple studies of reduced substance misuse (Waldron et al., 2001). | |
| 32 | Multisystemic Therapy | A therapeutic intervention for families with a young person who is at risk of going into care due to serious antisocial and/or offending behaviour. The focus is on using the parents as the primary agents of change, so the intervention includes strategies to improve the parents' effectiveness and the quality of the relationship with their child. | 12–17 | Individual & family therapy | Level 4+ evidence from multiple, internationally conducted studies including a US evaluation demonstrating reduced youth offending, antisocial behaviour and psychiatric symptomology (Butler et al., 2011; Bourdin et al., 1995) as well as reduced criminal arrests and reduced criminal arrests and family-related civil court cases at a 14- and 22-year follow-up, respectively (Schaeffer et al., 2005; Sawyer et al., 2011). Additionally, an evaluation in Norway found reduced internalising behaviour and reduced delinquency immediately post-intervention, followed by reduced behavioural problems and reduced out-of-home placements at an 18-month follow-up (Ogden et al., 2004, 2006). These findings are not universally upheld, however. For example, a recent UK study observed that while MST reduced self-reported criminal behavior, this improvement was not significantly better than what was achieved by standard youth justice practice (Fonagy et al., 2018). | |

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| 33 | Multisystemic Therapy for Child Abuse and Neglect | An intensive treatment for families who have recently been reported to Child Protection Services. A key aim of the intervention is to help families assume greater responsibility for their behaviours and actively work to resolve serious family issues. | 6–17 | Individual & family therapy | Level 3 evidence of reduced neglect, psychological aggression, minor and severe assault, non-violent discipline, symptoms of PTSD, dissociative symptoms, internalising symptoms, total behaviour problems and increased placement stability post-intervention (Swenson et al., 2010). |
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