

ACEs: Evidence, Gaps, Evaluation and Future Priorities

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There is strong evidence linking adverse childhood experiences (ACEs) and poor outcomes in adulthood both in terms of mental and physical health. Gaps in both the evidence base and research priorities still exist. These include understanding how to identify and assess risk in children who have experienced ACEs, and also the development and, importantly, the evaluation of interventions. Outstanding gaps include whether there are sensitive periods during childhood, the role of resilience/protective factors, the causal relationships, biological mechanisms and relative risk of ACEs for particular negative outcomes. ACEs affect individual children differently and chronic exposure appears to increase the risk of poor outcomes in adulthood, meaning interventions should also be tailored to the individual children, families and communities. Generally, there needs to be better evaluation of interventions and dissemination of this information to ensure that their use is evidence based. More input from affected communities, clinicians, funding bodies and Government departments is required to identify research priorities and ensure gaps in the evidence base are addressed.

Keywords: ACEs, children, early intervention, evidence-base, outcomes.

Introduction

The past few decades has seen increasing international interest in how experiences during childhood and adolescence, such as physical, sexual and emotional abuse and exposure to domestic violence, abuse of drugs and parental mental illness, can affect long term health. Increasingly evidence links such adverse childhood experiences (referred to as ACEs) with poor mental and physical health outcomes in adulthood. This article focuses on the evidence base and existing gaps linking ACEs with poor health outcomes and considers evidence for interventions. It is based on a submission by the Academy of Medical Sciences to the UK House of Commons Science and Technology Committee Inquiry into evidence-based early years intervention: <http://data.parliament.uk/writtenevidence/committeeevidence.svc/evidencedocument/science-and-technology-committee/evidencebased-early-years-intervention/written/75209.html>.

Evidence-base for the link between ACEs and long-term negative outcomes

ACEs can be broad in nature, and include mental/physical/sexual abuse, neglect, parental dysfunction/mental illness, or parental loss. There is strong evidence linking ACEs with long-term negative outcomes in areas such as mental health (Lereya *et al.*, 2013; Geoffroy *et al.*, 2014; Mars *et al.*, 2014; Jenkins *et al.*, 2015) social functioning, occupational stability, living standard, wellbeing, physical health (Bellis *et al.*, 2014; Holman *et al.*, 2016) and risk of premature death (Brown *et al.*, 2009). However, literature reviews highlight a lack of consistency and clarity concerning the definition, measurement and assessment of ACEs (McLaughlin, 2016). It is not always clear where the line is drawn between normative stress experiences and ACEs. There is also ambiguity as to whether low socioeconomic status (SES) should be considered a form of ACE, or an independent factor contributing to negative adult outcomes. Risk of exposure to ACEs may be more common in low SES environments (Hatch and Dohrenwend, 2007; Soares *et al.*, 2016). Poverty is a powerful predictor of mental illness, and it predicts many other causes of mental distress (Read, 2010).

There are links between poverty, brain development and behaviour that suggest that children with low SES have a higher chance of behaving in ways that could harm their health, and reduce life expectancy. Evidence is emerging that our capacity to resist environments that tempt us to overeat, smoke, drink excessively, or be physically inactive is influenced by the strength of our 'executive functioning'. Executive functioning skills (EFs) refer to the mental processes required when you have to pay attention, when going on 'auto pilot' would be ill-advised or insufficient. EFs are essential for mental health, physical health, and success; and for cognitive, social and psychological development (Diamond, 2013). Children living in low SES settings potentially face a double hit: living in environments that contain more cues for unhealthy behaviours, combined with exposure to psychosocial environments which may increase vulnerability to a reduction in the EFs to resist those cues (Stringhini *et al.*, 2010; Moffitt *et al.*, 2011). Further research is required to examine the roles of emotional processing and EFs in linking ACEs with negative outcomes in adulthood (McLaughlin, 2016).

There are several different methods of measuring ACEs. Most require self or parent report and assess up to twenty factors, most often including: parental incarceration, domestic violence, household mental illness, familial suicide and household alcohol or substance abuse. The methods usually use numeric, cumulative risk scoring methodology (Bethell *et al.*, 2017a). The same review suggests that research into a single standardised ACE measuring method would help accurately evaluate the link between ACEs and long-term outcomes.

Many studies in this area of research are relatively small, not population based and retrospective, which presents challenges for the evidence base as they are difficult to validate. Adults' recollection of childhood experiences can be biased by their subsequent health and wellbeing (Reuben *et al.*, 2016). Prospective studies provide the strongest data but the number of such studies is limited and fixed by the specific cultural and social context of the period in which they were carried out. Further research is required to address aspects of this field, such as whether particular sensitive periods exist for first exposure to ACEs during childhood. Some studies suggest that early-childhood exposure increases risk of negative adult outcomes including increased susceptibility to mental health problems (Sheridan *et al.*, 2012), other studies suggest that the time of first exposure has no influence on particular outcomes, such as suicide risk (Gomez *et al.*, 2017). It is still unclear how protective and resilience factors influence whether an individual will develop negative outcomes in adulthood. Little information exists that allows us to

predict which children will do well and remain resilient and which will develop negative outcomes after being exposed to ACEs. These gaps limit the ability to decide the best ways to encourage development of resilience in exposed children, or whether it would be better to strengthen their capacity to cope with stressors.

The biological pathways and the developmental mechanisms involved linking ACEs to adult outcomes remain poorly understood. The degree to which negative outcomes are mediated through either continued adversity, or through the ACE being embedded within behavioural, neuropsychological, immune, neuroendocrine or epigenetic change needs to be determined. Mechanisms which are being investigated and requiring further research include epigenetic changes (Vaiserman, 2015), neurobiological effects (McCrary *et al.*, 2017) and other biological correlates (Danese and McEwen, 2012), including changes in the biological stress response (Kalmakis and Chandler, 2015).

Physical health outcomes warrant further research to understand the mechanisms linking them with ACEs; these include cancer (Holman *et al.*, 2016), diabetes (Huang *et al.*, 2015; Huffhines *et al.*, 2016), chronic pain (Nelson *et al.*, 2017) and post-traumatic growth phenomena (Sapientza and Masten, 2011). The mechanisms underlying poor mental health and wellbeing following ACEs need further investigation, including substance abuse vulnerability (Somaini *et al.*, 2011), suicide (Sachs-Ericsson *et al.*, 2016), intimate partner violence (Montalvo-Liendo *et al.*, 2015), psychosis (Dvir *et al.*, 2013), and homelessness (Davies and Allen, 2017).

Screening that can identify children affected by ACEs needs additional research (Finkelhor, 2017), in conjunction with an improved understanding of the accuracy of ACE self-report, which can entail a risk of false-negative reports (Hardt and Rutter, 2004; Anda *et al.*, 2010). Many studies are not population-based, making studies small and potentially biased. There are few studies which address ACE risk in particular groups (for example, BME communities or high-risk subgroups such as multiply deprived children living with serious parental mental illnesses). There is also a lack of studies evaluating the outcomes of ACE exposure in developing countries (Sapientza and Masten, 2011).

It is likely that different types of ACE create risk for adulthood in varying ways but there is a lack of clarity in this area. Literature has highlighted this problem and prioritises future research that can tease out the effects of particular types of ACEs on different outcomes (Humphreys and Zeanah, 2015; McLaughlin, 2016). For example, one systematic review reported associations between physical abuse and psychological abuse and any type of cancer, and an association between sexual abuse with specific types of cancer. However, the same review also identified two studies that reported no association between physical and sexual abuse and cancer (Holman *et al.*, 2016). Another systematic review comparing the relationship between different types of ACEs and diabetes reported that parental neglect had the strongest influence, while physical abuse had the weakest influence on later risk of developing diabetes (Huang *et al.*, 2015).

Long-term adversity appears to be more damaging than single events. Many children are not exposed to just one type of ACE – adversity is often experienced in the context of a so-called broader ‘risky environment’ (Cicchetti and Toth, 2005). For example, poverty and parental substance dependence are linked to child deprivation, neglect and a lack of exposure to resilience factors. Chronic exposure to ACEs predicts the greatest negative outcomes in general (Anda *et al.*, 2010; Danese and McEwen, 2012) with an increased risk for multiple negative outcomes including for psychosis (Dvir *et al.*, 2013) and asthma (Exley *et al.*, 2015). Different people react differently to the same ACEs, leading to a range

of outcomes in exposed individuals. Further research is required to understand the reasons for individual differences following ACE exposure, including but not limited to research into resilience and vulnerability (McLaughlin, 2016; Traub and Boynton-Jarrett, 2017) as well as the effects of culture (Sapienza and Masten, 2011), ethnicity and gender (Kajeepta *et al.*, 2015), and mediating factors (Kalmakis and Chandler, 2015) including cognitive risk factors (Liu *et al.*, 2017).

Quality of the evidence-base for early-years interventions

A review examining the evidence base for youth interventions lists twenty-seven broadly psychotherapeutic programmes that are relevant and recognised as ‘well established’ or ‘probably efficacious’ and can be considered as evidence-based psychotherapies (Weisz *et al.*, 2015). Overall, there is a lack of evidence-based interventions (Bryson *et al.*, 2017), and few for certain populations. Many population groups need particular attention, including children in foster care (Hambrick *et al.*, 2016), children at risk of suicide (Sachs-Ericsson *et al.*, 2016), those experiencing intimate partner violence in the family (Montalvo-Liendo *et al.*, 2015), children of obese women (McDonnell and Garbers, 2017), ethnic minorities (Burnette and Figley, 2017), children with co-morbid psychosis (Dvir *et al.*, 2013), and young people experiencing homelessness (Davies and Allen, 2017).

It has also been suggested that we need to develop different interventions for different settings, such as those focused on families (Figley and Burnette, 2017), those with a whole community focus (Bethell *et al.*, 2017b) and interventions that may be used in primary care (Bransford and Blizard, 2016) as well as in psychiatric and residential treatment services (Bryson *et al.*, 2017). Further evidence needs to be gathered on how to engage families in interventions and the value of doing so (Bethell *et al.*, 2017b). We need to understand the barriers to implementing trauma informed care (TIC) and how sustainable changes in practice are following TIC training (Wilson *et al.*, 2017). TIC is a concept developed in the US to address the fact that many people in contact with mental health services have experienced trauma and to avoid staff practices in mental healthcare re-traumatising these people: for example, by pressuring a patient to accept medication which mimics previous experiences of powerlessness (Sweeney *et al.*, 2016). Finally, the feedback and perception of those who use mental health services and interventions need to be collected to better understand any issues regarding the mental health service experience and existing barriers to asking about childhood abuse (Read *et al.*, 2018).

Literature reviews suggest that the outcomes of interventions need better evaluation (Bethell *et al.*, 2017b). To be able to apply interventions effectively, further research, development and evaluation of particular approaches and interventions is necessary for ACE screening tools/approaches (Finkelhor, 2017), preventative interventions (Mayer and Thursby, 2012; Larkin *et al.*, 2014), trauma informed educational approaches (Brunzell *et al.*, 2016; Wiest-Stevenson and Lee, 2016) and TIC approaches (Oral *et al.*, 2016; Bryson *et al.*, 2017). Reviews highlight the need for more information on the overall costs of assessing and addressing ACEs (Bethell *et al.*, 2017b), cost-benefit analyses (Finkelhor, 2017), measures of costs saved (Mayer and Thursby, 2012) and cost-effectiveness (Larkin *et al.*, 2012). Research shows that the evidence base for many parent/family interventions aimed at improving parenting ability and child outcomes is relatively poor and therefore suggests that interventions must be appropriately targeted for optimal effect (Juffer *et al.*, 2005). In particular it is increasingly understood that the most vulnerable or most at risk

children are also the most sensitive to intervention. Intervention personalisation, where interventions are tailored to the individual child, the individual family and age or developmental stage, may be important and necessary. Not all interventions are good for all children. More understanding of the optimal timing of an intervention is needed, in terms of how the intervention interacts with child experiences and characteristics (Hambrick *et al.*, 2016), and possible sensitive periods during development (Huang *et al.*, 2015; McCrory *et al.*, 2017).

Local and national government policies for early-years interventions

It is claimed that evidence-based intervention programmes are little used in practice (Weisz *et al.*, 2015). Some practitioners may prefer nondirective styles of intervention that are not evidence-based but rather have ideological backing. The programmes can appear too tightly organised and lead to a lack of motivation for the young patient or the therapist. There is also a lack of dissemination of new and developing interventions to those commissioning or delivering services. One 2016 review of TIC approaches mentioned the US as the only nation to have a national policy related to trauma (Sweeney *et al.*, 2016). The same review describes TIC approaches as only beginning to reach the UK and having had little impact in the UK so far, even though there is evidence that TIC systems are effective and can benefit both staff and those receiving mental healthcare, at least in the short term. ACEs and trauma awareness were included in Scotland's Mental Health Strategy (2017–2027) (Scottish Government, 2017) and the Scottish government commissioned NHS Education for Scotland to develop a National Trauma Skills and Knowledge Framework and a National Training Plan for practitioners. Strategy documents on gender sensitive services that included trauma awareness were published by the Department of Health (Golding and Duggal, 2011). The Department of Health also made recommendations in 2003 that made enquiry about abuse compulsory in mental health settings, and initiated a programme aimed at training staff (Department of Health, 2003). However, there is little evidence that trauma enquiry occurs in routine practice. Updates to the National Institute for Health and Clinical Excellence guidelines, such as to the guidance for the management of schizophrenia (NICE, 2014), may help prompt TIC being adopted. One review lists a number of barriers to implementation of TIC, including resistance by practitioners to the causal link between trauma and ACE to later risk of psychosis and mental distress, and the fact that continuous change to UK public services leads many to be wary of new initiatives (NICE, 2014).

Poor dissemination and a lack of accessibility and visibility of research represent challenges to the implementation of new evidence-based practice. One review of the assessment and response to ACEs highlighted a lack of awareness of new research and care strategies by nursing staff, who form the largest proportion of frontline healthcare staff (Waite *et al.*, 2010).

Future priorities

The UK Research Councils recognise that this research into ACEs and their implications requires additional funding. This is particularly true for mental health; several funding bodies are highlighting the relevance of early life experience (e.g. 2017 Medical Research Council mental health strategy, Medical Research Council, 2017). Funding mechanisms are designed to create competition between expert groups and universities rather than

collaboration where groups with common or overlapping expertise are drawn together. Public and third sector funding bodies put out researcher-led or themed calls – however, there may be little input from stakeholders or affected groups. There is a corresponding limitation in the effective setting of research priorities on a national basis. The James Lind Alliance (JLA) is an example of a mechanism that allows ‘Priority Setting Partnerships’ to be established with the aim of bringing patients, carers and clinicians together to identify research priorities (www.jla.nihr.ac.uk/jla-guidebook/chapter-3/prioritysetting-partnerships.htm). There is need for better coordination between research about ACEs and associated outcomes including mechanisms and research on the effectiveness of interventions, which is separately funded.

Much of the scientific research in this field is fragmented and focused on specific health or social outcomes, without being more widely framed. There is an urgent need for rigorous reviews of the evidence concerning ACEs. NICE produces authoritative reviews on interventions for individual disorders but is limited by its restriction to health and social care. This area was partly the key remit of the National Academy of Parenting Practitioners (NAPP) (Department for Education, 2012), which closed in 2010. The NAPP aimed to provide an understanding for commissioners and educators of the quality of the evidence base for the range of parenting interventions, monitor their use and co-ordinate the development of research projects and measures. The potential value of such a body remains. The model could be extended to include educational and primary care interventions. More work is needed to improve information sharing about children’s exposures to ACEs, as well as sharing and accessibility of evidence. NAPP recommended creating a ‘living’ evidence synthesis and dissemination mechanism to use existing dissemination platforms to ensure that information reaches those involved in children’s health services; using existing rapid-cycle learning platforms to maintain networks of families and professionals to promote cross-sector learning and engagement; and developing open-source training and tools (Bethell *et al.*, 2017b).

As highlighted above, there is a need for improved coordination of research in this area in order to ensure children and young people living with adversity are at the heart of the process to help set priorities and programmes whereby evidence gaps can be addressed. One mechanism may involve an expert commission able to develop a portfolio of research agreed by a representative panel of experts by experience alongside researchers crossing disciplinary boundaries, and setting out a series of agreed aims, priorities, milestones and outputs.

Acknowledgements

This article is based on the evidence submitted by the Academy of Medical Sciences to the House of Commons’ Science and Technology Committee inquiry into evidence-based early-years intervention (e-mail: info@acmedsci.ac.uk). The article includes contributions from Eric Taylor (Institute of Psychiatry, Psychology and Neuroscience, King’s College London) and David Gunnell (Population Health Sciences, University of Bristol).

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