Paediatric Progress: How Should It Change Your Practice?

Adverse childhood experiences: Basics for the paediatrician

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Abstract

In 1998, the Centers for Disease Control and Prevention Adverse Childhood Experiences study established the profound effects of early childhood adversity on life course health. The burden of cumulative adversities can affect gene expression, immune system development and condition stress response. A scientific framework provides explanation for numerous childhood and adult health problems and high-risk behaviours that originate in early life. In our review, we discuss adverse childhood experiences, toxic stress, the neurobiological basis and multigenerational and epigenetic transmission of trauma and recognized health implications. Further, we outline building resilience, screening in the clinical setting, primary care interventions, applying trauma-informed care and future directions. We foresee that enhancing knowledge of the far-reaching effects of adverse childhood events will facilitate mitigation of toxic stress, promote child and family resilience and optimize life course health trajectories.

Keywords: Adverse childhood experiences; Childhood adversities; Life course; Social paediatrics.

It is well established that cumulative adverse childhood experiences (ACES) can have a long lasting impact on child development and life course health. The relationship may be dose responsive. Child development is the result of an ongoing relation between biology (child’s genetic predisposition) and ecology (social and physical environment) (1). Neural connections are particularly sensitive in the first years of life and can be damaged during extreme and frequent stress periods. Toxic stress is repeated exposure to stress without the buffering of responsive relationships (2). ACES may cumulate to have profound lifelong effects unless mitigated by protective factors (3). Resilience is the ability to overcome significant adversity. Nurturing relationships within the family and community are specifically important for developing resilience. Our review aims to enhance the knowledge of ACES and explore factors that promote child and family resilience.

WHAT ARE ACES?

ACES are events or continuous exposure to circumstances beyond a child’s control that may negatively impact their well-being. In 1998, the Centers for Disease Control and Prevention and Kaiser Permanente studied the influence of ACES on adult health outcomes. The ACEs study examined childhood exposure to abuse, neglect, domestic violence and household dysfunction (Table 1) (4). Unexpectedly, ACES were common and cumulative. Further, a dose–response relationship was observed, whereby people with a greater number of ACES were more likely to have poorer developmental and health outcomes. Many people had experienced childhood abuse or household dysfunction, such as parental alcohol/drug use, mental health problems or criminality. Leading risk factors for death were increased by ACES, including smoking, alcohol abuse, obesity, physical inactivity, use of illicit drugs,
promiscuity and suicide attempts. Compared to persons with no ACEs, those with four or more ACEs were twice as likely to be smokers and many times more likely to have attempted suicide, be alcoholic and have injected street drugs (5). In addition, persons were more likely to suffer from physical illnesses such as diabetes, cancer, heart disease and mental illness (4) (Figure 2). Later ACEs studies have included other adverse experiences, such as growing up in foster care, poverty (6) and exposure to violence (7). Of note, individuals with more ACEs had poorer developmental and health outcomes even after controlling for health risk behaviours, which pointed to underlying biological impacts of ACEs. These findings prompted research into the biological underpinnings, namely the influence of toxic stress.

**TOXIC STRESS**

Learning how to cope with stress is an important part of healthy child development. When a young child's stress response system is triggered—the child's body responds by increasing heart rate, blood pressure and stress hormones, such as cortisol. Positive stress is exposure to a stressor that resolves with the help of a responsive caregiver and a normal and an essential part of healthy child development (e.g., a distressed child being examined by a paediatrician while being comforted by their caregiver). With tolerable stress there is exposure to a non-normative life event (e.g., loss of a family member or family divorce) that is buffered by supportive relationships and allows for resolution of the stress response. However, in the absence of supportive relationships, a toxic stress response can occur (8), which cause prolonged activation of the hypothalamic-pituitary-adrenal (HPA) axis and cortisol production (9). The HPA axis plays an important role in managing metabolic and cardiovascular responses to acute and chronic stress (2). Frequent and heightened levels of cortisol exposure on the brain can lead to detrimental effects on brain structure and affect the child's learning and behaviour (2). In addition, prolonged activation of the stress response may cause HPA dysregulation with over or under production of cortisol (10). Too much cortisol may result in immune suppression and higher risk of infection, while too little cortisol may prolong the length of inflammatory response (2).

The impact of toxic stress on stress circuits can be expressed at the molecular level. These 'disturbances' leave a molecular mark on the genome in the form of epigenetic modifications and result in a biological 'embedding' of early life experiences. This not only shapes the trajectory of future health outcomes, but can also result in substantial and lasting effects on the molecular structure of genes (10). Epigenetic changes may pass onto future generations resulting in multigenerational dysregulation of the stress response (11). Increasingly apparent, the origins of adult diseases may be traced back to developmental and biological disturbances that occurred in early life (12).

**LIFE COURSE HEALTH**

Toxic stress experienced in early life can impact the individual's mental and physical health (Figure 1). The cumulative and dose–response effect of ACEs predicts a greater likelihood of later problems. Likewise, recent and persistent exposures (13–15), as well as combinations of ACEs (e.g., maternal mental health and poverty) (16) have greater implications for child health. Children with more ACEs have higher rates of infections, asthma and obesity compared to a general paediatric population (17). They are at increased risk of somatic complaints, such as headaches, tiredness and stomach problems, while their caregivers more frequently report poor child health (14,18). Further, mental health conditions are more common, including developmental and educational delays, poor school engagement, attention and oppositional defiant disorders and anxiety/depression (17,19,20). Adolescents are at higher risk of delinquency, internalizing negative behaviours, drug use and early pregnancy (13). Adults with adverse experiences in early childhood are more likely to have health problems and more risky health behaviours (12,21) (Figure 2). Associated physical conditions include diabetes, cancer and heart disease, while mental illnesses include depression and health risk behaviours, such as sexual risk behaviours and substance abuse (21,22).

**BUILDING RESILIENCE**

Resilience is the ability to overcome significant adversity. Importantly, resilience is built over time. Nurturing families embedded within strong neighbourhoods and communities can proactively protect from and mitigate the effects of ACEs (23–25). Promoting safe, stable and nurturing relationships can mitigate the effects of ACEs and optimize health, academic success and economic productivity (26). Resilience results from a complex interaction between the child's genetic makeup, temperament, past experiences and social supports (27).

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**Table 1. Adverse childhood experiences**

1. Recurrent physical abuse
2. Recurrent emotional abuse
3. Contact sexual abuse
4. An alcohol and/or drug abuser in the household
5. An incarcerated household member
6. Family member who is chronically depressed, mentally ill, institutionalized or suicidal
7. Mother is treated violently
8. One or no parents
9. Physical neglect
10. Emotional neglect

Adapted from ref. (7). Note: Experiences are prior to age 18.
Modifiable child resilience factors include a child’s positive appraisal style (to assess adverse situations in a non-negative way) and cognitive and executive function skills (28). Household modifiable resilience factors include a nurturing parenting style and consistent household routines (29). Daily routines (e.g., bedtime routine, reading routine) are important for creating feelings of safety in young children and establishing the foundation for self-care, self-regulation and school-readiness. Higher levels of household routines in preschool children predicted less teacher reported hyperactivity and inattention problems, conduct problems and more pro-social behaviour in kindergarten (30). Further, community modifiable resilience factors include home-visiting programs for pregnant women and families with newborns, intimate partner violence prevention programs, social support for parents, high quality child care and sufficient financial support for lower income families (24,31,32). Finally, promoting resilience in the paediatric office include creating a medical home for children with ACEs to create longitudinal relationships, integrating behavioural health care in the paediatric office and familiarizing all paediatric staff with resources in the community (31).

SCREENING FOR ACES IN CLINICAL PRACTICE

In light of health implications, there has been a recent push to identify ACEs in the US paediatric primary care practices (33). However, Canadian guidelines are lacking. Despite this, some health care practitioners have begun screening patients for ACEs, although concerns of identification with little evidence for interventions exist. In response, researchers have suggested that clinicians focus on the child’s home environment, asking...
specifically about parental depression, intimate partner violence and alcohol or substance abuse, for which evidence-based interventions have been offered (34). Another approach suggests to screen all families with one basic question, ‘Has anything scary or upsetting happened to your child or your family since the last time I saw you?’ (31).

A number of formal screening questionnaires to identify ACEs in pediatric primary care have been published (35). The Safe Environment for Every Kid Model (SEEK) is a 20-item parent screening questionnaire to identify targeted psychosocial risk factors (e.g., substance abuse, maternal depression). A cluster randomized control trial which assessed the SEEK model in US pediatric primary care demonstrated that using this questionnaire led to significant improvement in several psychosocial outcomes, including greater adherence to their child’s medical treatment and reduced involvement of child protective services (36). Recently, the Center for Youth Wellness developed an ACEs questionnaire to identify patients at increased risk of chronic health problems, learning difficulties and mental and behavioural health problems; there is a version for parents of children and adolescents and a self-report adolescent version. The instrument consisted of two sections: the first section screened for the traditional ten ACEs and the second section included items assessing for exposure to additional life stressors identified by community stakeholders (e.g., involvement in foster care, bullying, community violence). This questionnaire is free and takes approximately 5 minutes to complete, however formal evaluation has not been performed (37).

### PRIMARY CARE INTERVENTIONS

The American Academy of Pediatrics (AAP) describes the reduction of toxic stress in young children to be a high priority for pediatrics (38). Although evidence for sustainable and effective approaches is limited, integration of interventions into primary care visits is feasible and can favourably affect clinical practice and family outcomes (3,39).

Paediatric providers are challenged by insufficient training. However, didactic instructions have included teaching clinicians to use screening questionnaire (40,41) and recognizing toxic stress (34,42). After screening, procedures to address identified problems have included referral to parenting programs (42), a telephone-based parenting curriculum (42), referral to a social worker (36) or handing out a wallet-size referral card (43). Further, experiential interventions have included having resident physicians spend a rotation with ambulatory clinicians or visit community agencies to learn about biosocial and developmental problems (44), conducting role play sessions (45), interacting with social workers (41) and providing clinicians with a manual on psychosocial issues (42). Training has resulted in improved screening rates (41,45), perceived competence and more positive attitudes toward patients with psychosocial difficulties (46). Furthermore, outcomes among parents and children found reduction in the behavioural consequences of ACEs (36) and increase in referral to community resources (47).

### APPLYING TRAUMA-INFORMED CARE

Beyond the implications on development and overall health, ACEs may result in trauma. When screening for ACEs practitioners should be aware of the potential for disclosure of trauma and be able to implement trauma-informed care (TIC). For the health care provider, TIC encompasses inclusion of an understanding of trauma into routine health care and the treatment experience, and provides emotional support, positive coping and guidance for recovery (48). The principles are 1) realizing and understanding the impact of trauma; 2) recognizing trauma in children, families and health care providers; 3) responding by applying knowledge into practice and 4) resisting retraumatization (49). TIC requires collaboration with community partners at all levels to actively address the needs of traumatized children. From the trauma perspective, the insightful question may be ‘what happened to you?’ rather than ‘what is wrong with you?’ (50).

### FUTURE DIRECTIONS

#### Policy implications

The neurobiological basis of ACEs suggest the possibility that supporting healthy early childhood development can prevent consequences (51,52). Early strategies that identify and support at-risk children and families may decrease the need for subsequent interventions. Policies and programs must be directed toward high quality day care, early childhood education, child protection services, mental health and family income support. However, barriers in health care include the relative lack of health care spending on paediatric preventive services and emphasis on treatment rather than pre-emptive parental guidance (51). Promoting caring, safe and supportive relationships within the family and community can prevent or reverse the adverse outcomes of toxic stress (23,25,53,54).

#### Professional development

Health care practitioner education is a key component to offering TIC. Physicians are reluctant to screen for ACEs for many reasons, including lack of time, reimbursement or training and have discomfort in discussing trauma. However, when offered professional training, practitioners are more likely to inquire and feel comfortable about ACEs (28). Further, evidence-based clinician training resources (Table 2) should be...
CONCLUSION

ACEs result in detrimental effects on life course health and negative adult health outcomes. Adverse exposures in childhood are common, inter-related and dose-dependent. ACEs are a major determinant of subsequent health and well-being impacting social cost, health care utilization and quality of life. The future research agenda calls for basic scientists to develop practice-friendly biomarkers; for public health physicians to implement evidence-based interventions; for teachers to find effective methods to educate trainees and practitioners; and for clinicians to support nurturing families and strengthen neighbourhood and community resilience (26). We must take advantage of every opportunity to translate our knowledge of ACEs into practice and policy.

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