




Special Issue Article

Measuring early life adversity: A dimensional approach

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Abstract

Exposure to adversity in childhood is associated with elevations in numerous physical and mental health outcomes across the life course. The biological embedding of early experience during periods of developmental plasticity is one pathway that contributes to these associations. Dimensional models specify mechanistic pathways linking different dimensions of adversity to health and well-being outcomes later in life. While findings from existing studies testing these dimensions have provided promising preliminary support for these models, less agreement exists about how to measure the experiences that comprise each dimension. Here, we review existing approaches to measuring two dimensions of adversity: threat and deprivation. We recommend specific measures for measuring these constructs and, when possible, document when the same measure can be used by different reporters and across the lifespan to maximize the utility with which these recommendations can be applied. Through this approach, we hope to stimulate progress in understanding how particular dimensions of early environmental experience contribute to lifelong health.

Keywords: dimensional models; adversity; measurement; deprivation and threat; adverse early experiences; ACEs

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Experiences of childhood adversity are common and strongly associated with elevated risk for long-term negative health outcomes, including poor physical health, early mortality, and a wide range of mental health problems, observed even in mid to late life (Dong et al., 2004; Felitti et al., 1998; Grummitt et al., 2021; Rich-Edwards et al., 2012). Findings from observational studies have been supported by randomized control trials that manipulate early environmental experience, documenting causal effects of adversity experiences on mental health, as well as numerous aspects of brain and behavioral development (Humphreys et al., 2015; Muennig et al., 2009; Sheridan et al., 2010; Sheridan et al., 2018). Evidence that adversity experiences are strongly related to variability in health and well-being outcomes has generated a number of useful theories conceptualizing the impact of adversity on developmental outcomes (e.g., Belsky & de Haan, 2011; Evans et al., 2013; Humphreys & Zeanah, 2015a; McLaughlin et al., 2014; Sheridan & McLaughlin, 2014). These models generally agree that numerous mechanisms through which early experiences influence long-term health outcomes reflect biological embedding during periods of developmental plasticity, such that environmental experiences can alter the structure and function of the developing nervous

system (Hertzman & Boyce, 2009). Indeed, a thriving literature has documented both when (Gabard-Durnam & McLaughlin, 2020; McLaughlin & Gabard-Durnam, 2021; Nelson & Gabard-Durnam, 2020) and how (2021; Danese et al., 2007; Jenness et al., 2020, Miller et al., 2018; Miller et al., 2011; Shackman et al., 2007; Sheridan et al., 2020) experiences of early-adversity influence health and well-being.

The emergence of rich theory has been paralleled by an explosion of research on the associations between early-life adversity with developmental and health outcomes in childhood, adolescence, and early adulthood over the past decade. Although a substantial evidence base has appeared on the links between adversity and health outcomes, a major impediment to progress has been variability in how adversity is conceptualized and measured across studies. Here, we make recommendations for measuring adversity, with a focus on measures that can be used to assess dimensions of environmental experience that have been the focus of recent theoretical models (McLaughlin, et al., 2014; Sheridan & McLaughlin, 2014). We suggest these measures specifically for use in research, not as diagnostic tools with a clinical application (Baldwin et al., 2021). We review measures for assessing adversity in (a) childhood and adolescence and (b) adulthood. When possible, we propose measures that can be used at multiple life stages and by multiple reporters. This article is intended to be useful in planning novel data collection projects and understanding how to interpret previously collected data. Specific assessment tools may measure

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relatively unique constructs and therefore yield different findings based on their operational definitions of early life adversity. Here, we begin with mechanistic theories of early-life adversity and identify a set of measures for which mechanisms have been proposed, and in some cases, tested.

Approaches to conceptualizing early-life adversity

A common approach to conceptualizing and measuring early-life adversity is cumulative risk (Evans *et al.*, 2013; Felitti *et al.*, 1998). Cumulative risk focuses on the discrete number of adverse experiences a child has encountered, without regard to the type, timing, severity, or chronicity of these experiences (see McLaughlin *et al.*, 2021 for a review). The cumulative risk approach involves creating a count of the number of distinct types of adversity, which are conceptualized as indicators of developmental risk (Evans *et al.*, 2013). In this approach, many kinds of childhood adversity are assessed, and the number of exposures endorsed is summed to construct a risk score. Forms of adversity commonly included in cumulative risk scores include abuse, neglect, domestic violence, parental criminal behavior, parental divorce, and parental psychopathology, as well as experiences of community violence, peer victimization, and poverty (Dong *et al.*, 2004; Finkelhor *et al.*, 2013). Implicit in the cumulative risk approach is the assumption that the mechanisms through which these diverse experiences influence health outcomes are largely shared or universal (McLaughlin *et al.*, 2021). The primary proposed mechanism linking cumulative risk with a wide variety of health outcomes is allostatic load, or disruptions in physiological regulatory systems that result from chronic experiences of stress (Danese & McEwen, 2012; McEwen & Gianaros, 2010). Many people have recommended strategies for how to measure cumulative risk using count scores of childhood adversity exposure types (Evans *et al.*, 2013; Felitti *et al.*, 1998) or using these scores to create latent class profiles (Lanier *et al.*, 2018). However, the cumulative risk method has several notable limitations (Belsky *et al.*, 2012; McEwen, 2019; McLaughlin & Sheridan, 2016). Details on these critiques can be found elsewhere (McLaughlin *et al.*, 2021).

Dimensional models have proposed an alternate approach to measuring and conceptualizing the influence of adversity on neurobiological development and subsequent health and well-being. These models focus on dimensions of environmental experience that are shared across multiple forms of adversity (McLaughlin *et al.*, 2021). Dimensional models have been proposed by multiple researchers (Belsky *et al.*, 2011; Ellis *et al.*, 2009; Humphreys & Zeanah, 2015b; Sheridan & McLaughlin, 2014) and have converged on three primary dimensions that capture core elements of the environment that are present across a wide range of adversity experiences. These include dimensions of threat and harshness that reflect experiences of harm, or threat of harm, to the physical integrity of the child, such as experiences of violence (e.g., physical and sexual abuse, domestic violence, and community violence; McLaughlin *et al.*, 2014); deprivation, which reflects reductions in expected experiences involving social and cognitive stimulation – particularly in the context of caregiver interactions (e.g., neglect, institutionalization, parental separation, lack of consistent caregiver interactions, and material deprivation; Sheridan & McLaughlin, 2016a); and unpredictability (Baram *et al.*, 2012; Belsky *et al.*, 2011), which involves a lack of temporal stability in caregiving and other aspects of the early environment.

Theoretical models of threat suggest that children who experience threatening early environments are likely to exhibit changes

in emotional processing that reflect enhanced sensitivity to threat-related information, increased emotional reactivity, and alterations in emotional learning, as well as accelerated biological aging (Belsky *et al.*, 2011; Humphreys & Zeanah, 2015b; McLaughlin *et al.*, 2014; McLaughlin & Lambert, 2017). Existing research is largely consistent with these claims linking numerous experiences reflecting threat – including abuse, domestic violence, and community violence – with enhanced processing of threat-related information, elevated emotional reactivity, alterations in emotional learning, changes in neural circuits involved in salience processing and emotional learning, and more rapid biological aging (2009; Colich *et al.*, 2020; McLaughlin *et al.*, 2019; Pollak *et al.*, 2000; Pollak & Tolley-Schell, 2003). Deprivation, or reductions in social and cognitive stimulation from caregivers, has been theoretically linked with changes in high-order cognitive abilities (Humphreys & Zeanah, 2015b; Sheridan & McLaughlin, 2016a). Again, existing research across a variety of settings is consistent with this claim linking reductions in caregiver interactions, neglect, and institutionalization with language, executive functioning, and social cognition (2020; Geoffroy *et al.*, 2016; Miller *et al.*, 2018; Rosen *et al.*, 2020; Salhi *et al.*, 2021; Sheridan *et al.*, 2018).

Recently, these dimensional models have gained substantial traction as important new ways of conceptualizing adversity. However, little information exists on how to measure early-life environmental experiences along these dimensions. Numerous existing measures are capable of assessing the dimensions of threat/harshness and deprivation. In contrast, it is more challenging to assess unpredictability and less agreement exists about how to do so (Young *et al.*, 2020); but see Belsky *et al.*, 2011; Davis *et al.*, 2017; Glynn *et al.*, 2018 for suggestions on measuring this construct. Given that a review focused on measuring unpredictability was recently published (Young *et al.*, 2020), we do not focus on measurement of unpredictability in this article. Here, we propose approaches for measuring threat and deprivation. Note also that existing measures of deprivation focus largely on social, cognitive, and material deprivation and are less well-suited to assessing emotional aspects of deprivation, which also have pervasive influences on developmental and health outcomes (Tottenham, 2013).

Considerations for measurement of adversity across the lifespan

Most studies examining associations of early-life adversity with brain, behavior, and health outcomes have been conducted in samples of children, adolescents, or early adults. As of yet, only a limited amount of evidence documents associations between dimensions of adversity and outcomes in mid to late life (Geoffroy *et al.*, 2016; Pereira *et al.*, 2019). Understanding the links between early experience and adult health is complicated by the fact that the overlap between those who are identified during childhood and adolescence as having experienced adversity and those who report these experiences retrospectively in adulthood is relatively low (Baldwin *et al.*, 2019). This poor agreement may reflect differences in motivation, measurement approaches, and memory biases, among many other factors, and both retrospective and prospective reporting biases exist. Additionally, adult psychopathology is more strongly associated with self-reported maltreatment in adulthood than it is with court-documented or informant-reported (i.e., by caregivers, researchers, or clinicians) maltreatment in early childhood (Danese & Widom, 2020; Newbury *et al.*, 2018).

Despite the challenges in retrospective assessment of early-life adversity in adulthood, such work is essential for efforts to understand the links between early experience and later health. Prospective studies are expensive, time-consuming, and when focused on associations of early experience with later health, can take many decades to complete. As such, we review measures that can be used prospectively with children and adolescents and/or their caregivers, as well as those appropriate for retrospective assessment of childhood exposure in adults. We separately outline measures which can be used to assess threat and deprivation. We describe measures that assess a variety of experiences that reflect each of these dimensions separately. Within each dimension, we have organized these measures by the age group and reporter for whom they are intended: those that could be used in childhood, completed by caregiver, and youth for prospective assessments of adversity experiences, and then complimentary measures that can be used in adulthood for retrospective assessment of these constructs.

Measurement of dimensions

Below we recommend specific measures to assess threat and deprivation. Most existing work on childhood adversity has focused on the presence or absence of specific exposures, such as maltreatment experiences like abuse and neglect. Indeed, coding the presence or absence of discrete exposures is required to utilize a cumulative risk approach (Evans et al., 2013). As a result, most existing measures of adversity are designed to capture the presence or absence of a *particular* exposure. In contrast, when using a dimensional approach, the goal is to assess the presence, severity and frequency, of a wide range of experiences along that dimension (see McLaughlin et al., 2021 for a complete discussion). For example, to assess the dimension of threat, an ideal measure would evaluate the severity and frequency of witnessing or experiencing several different forms of interpersonal violence. Until new measures are developed with the goal of assessing underlying dimensions of experience, researchers working in this area must rely on existing measures that can be used to approximate these dimensions. Because of this, we suggest assessing threat and deprivation broadly using multiple measures and creating dimensional variables from them.

Threat

In the dimensional model of adversity, threat is defined as harm or threat of harm to the physical integrity of the child, which can occur as a result of experiencing or witnessing interpersonal violence or traumatic events in which one believes that one's life or the life of a close other is in danger. Most existing measures focus on one particular form of exposure to violence (e.g., partner violence, abuse, or community violence). Therefore, we list several psychometrically sound measures below that measure unique aspects of threat and can be combined to more fully assess this domain. See Table 1 for a summary of recommended measures of threat by reporter. We begin with assessment via caregiver report of children's exposure to threat.

Caregiver report of children's threat experiences

The violence exposure scale for children-revised (VEX-R)

The VEX-R is an interview-based measure that was originally designed to be administered to children (Raviv et al., 2001; Raviv et al., 1999); however, the interview can also be administered to parents using the Parent-Report (VEX-PR) to obtain parental

Table 1. Measures of threat exposure

Type of exposure	Measure name (authors, year)	Caregiver About child	Child self-report	Adult retrospective
Interpersonal violence (general)	VEX-R	✓	✓	
Interpersonal violence (general)	CTQ		✓	✓
Interpersonal violence (general)	JVQ	✓	✓	✓
Family violence (general)	CTS	✓		
Physical and sexual abuse	CTS-PC (R)	✓	✓	
Intimate partner violence	CTS-2	✓		
Physical and sexual abuse	MACE			✓
Other trauma	UCLA PTSD RI	✓	✓	✓

report of children's exposure to various forms of violence (Fox & Leavitt, 1995; Shahinfar, et al., 2000). The VEX-R is the only measure of threat that can be used independently to create a dimension of threat. The VEX-R assesses the frequency of experiencing and witnessing a wide range of experiences of violence and includes 22 items. For each form of violence, separate questions evaluate witnessing violence occurring to someone else (e.g., How many times has your child seen or heard someone push or shove another person really hard?) and direct experiences of violence (e.g., How many times has someone pushed or shoved your child really hard?). Responses are provided on a Likert scale ranging from 0 (*Never*) to 3 (*Lots of times*). A total score reflects the frequency of witnessing and experiencing various forms of violence, and separate sub-scales can be created for witnessing and direct experiences of violence, and/or separated by Mild Violence or Severe Violence. The VEX-R does not query the specific context (e.g., home or school) where violence occurred nor the perpetrator of violence as it was not designed to assess maltreatment experiences specifically. The parent-report version (VEX-PR) demonstrated adequate convergent validity with other measures and internal reliability consistency (David et al., 2015; Shahinfar et al., 2000). An Israeli study that assessed both child and caregiver reports found similar means and positive correlations between reporters except for a non-significant correlation for child witnessing violence at school (Raviv et al., 2001). Scales appropriate for including in the threat dimension are those assessing witnessing and direct experiences of violence. Items that may be proxies for unpredictability or dangerous environments are not explicitly instances of violence (e.g., seeing someone sell drugs) and therefore should not be included in the calculation of a threat index.

The juvenile victimization questionnaire (JVQ)

The JVQ (Finkelhor et al., 2005 later updated to the JVQ-R2; Finkelhor et al., 2011) is a 34-item measure of victimization

experiences in children ages 2–17. A caregiver version exists that assesses victimization occurring to one's child. The JVQ screens for 5 domains: Conventional Crime, Child Maltreatment, Peer and Sibling Victimization, Sexual Victimization, and Witnessing and Indirect Victimization. Each of these areas has its own module, which can be used individually as needed in any area that requires a more focused assessment. Optional follow-up items include the number of times the child experienced each victimization, the perpetrator, whether there was an injury, and specific questions about certain instances. One of the benefits of the JVQ is that it has been used in population-representative samples to establish national estimates of the prevalence of different types of adverse experiences (Finkelhor *et al.*, 2005). In addition to options of full or abbreviated interviews (with reduced set of follow ups), the JVQ can be specified to assess instances from the past year or lifetime exposure and be administered as a basic screen (with no follow-ups), or a reduced item format (12 basic screens without follow-up), which can take as few as 5–10 minutes. Administration for the full version of the JVQ including follow-up questions takes approximately 20–30 minutes. Scales appropriate for including in the threat dimension are Conventional Crime, Child Maltreatment, Sexual Victimization, and Witnessing.

The conflict tactic scales (CTS)

These sets of scales are well suited to assess parent-child conflict and partner violence and can be administered to caregivers. Exposure to abuse, neglect, and harsh punishment are measured on the Parent-Child Conflict Tactics Scale (CTS-PC; Straus *et al.*, 1998; Straus & Hamby, 1997). Intimate partner violence is measured on the Revised Conflict Tactics Scales (CTS-2; Straus *et al.*, 1996). An earlier version is simply called the Conflict Tactic Scale (CTS) and measures a number of aspects of family conflict with a low degree of specificity. This 10-item short forms that take less than 5 minutes to complete. The CTS total score from the 10-item short form is appropriate for assessing the threat dimension as long as items assessing addressing conflict with positive discussion are inverse-scored or removed. Additional details on the two specific CTS measures are below.

The conflict tactic scales-parent child (CTS-PC)

This parent-child version of the CTS is a relatively brief measure (27 questions; 6–8 minutes to complete) administered to caregivers regarding current or recent abuse and maltreatment within the family or home environment. Subscales assess corporal punishment, physical abuse, sexual abuse, psychological aggression, neglectful behavior by the caregiver, and nonviolent discipline. Note that the neglectful behavior subscale is a measure of deprivation, not threat, and the nonviolent discipline scale should not be included as a measure of threat. Severity scales provide a dimensional measure capturing the severity of experiences for each subscale. The CTSPC can be scored in several ways, depending on the characteristics of the sample, measurement purpose, and subscale use. The annual prevalence and annual frequency methods are the most common scoring methods, which involve summing the number of times each behavior was reported. The CTSPC has been used in over 100 published studies, including national and international studies. A short form (CTS-PCS; Straus & Mattingly, 2007) is only 10 questions, requiring 2–3 minutes to complete. The CTS-PCS is highly correlated with and elicits 80–96% of maltreatment experiences as compared to the full length form (Straus & Mattingly, 2007). Scales appropriate for including in the threat dimension are corporal punishment, physical abuse, and sexual abuse.

The conflict tactic scales-2 (CTS-2)

The CTS-2 is designed to measure intimate partner violence, as reported by a caregiver. This is conceptualized as an adversity experience for children who observe (*i.e.*, see or hear) this type of violence between caregivers. The measure consists of 39 items, which are each asked twice: once about the respondent's behavior and once about their partner's behavior, yielding a total of 78 questions (10–15 minutes for administration). Items refer to specific acts and events that can apply to all couples including how frequently the respondent or their partner has engaged in behaviors ranging from showing concern and respect to severe physical assault. The measure has a 6th grade reading level and has been used widely across sociodemographic groups. The CTS-2 is a self-report measure but can also be administered verbally. Subscales include Negotiation (6 items), Psychological Aggression (8 items), Physical Assault (12 items), Sexual Coercion (6 items), and an Injury subscale (7 items) to assess the impact of the violence. Most commonly, studies ask about behaviors in the past year, but the time frame assessed is adaptable. Scoring involves summing the average frequency for each event in the subscale and converting to scaled scores. The CTS-2 can be used to estimate prevalence (% endorsing at least one instance of each behavior) and chronicity (average frequency of each endorsed behavior). Psychometric properties may differ depending on the population (see review in Vega & O'Leary, 2007). Test-retest reliability coefficients were 0.97–1.00 ($p < .001$) with internal consistency coefficients from 0.76 to 0.89. Straus and Douglas (2004) developed a short form, which consists of 10 questions and requires approximately 3 minutes to administer. Scales appropriate for including in the threat dimension are Physical Assault, Sexual Coercion, and the Injury subscale.

UCLA posttraumatic stress disorder reaction index (UCLA PTSD RI) for DSM-5

Many life-events checklists include questions about exposure to other types of violent events (natural disaster, terrorism, war). One example of such a checklist is the UCLA Posttraumatic Stress Disorder Reaction Index (UCLA PTSD RI; Rolon-Arroyo *et al.*, 2020; Steinberg *et al.*, 2004). While this index as a whole is most notably used to assess symptoms of PTSD, the initial checklist simply identifies the presence or absence of a set of exposures and is commonly completed by caregivers about children. This checklist can also assess the child's age(s) at the time of exposure to each event to consider their developmental context. The total score from the initial checklist is appropriate for using in the threat dimension.

Prospective assessment of threat exposure in childhood

Children can also report on their own life experiences. Assessing family violence using reports from children and adolescents has clinical, ethical, and legal ramifications. In research use, there are questionnaires which assess potential abuse experiences directly (*e.g.*, the CTS-PC asks specific questions about experiences which would be very likely or would clearly be defined as physical or sexual abuse). Other questionnaires (*e.g.*, the CTS, VEX-R, or JVQ) ask more general questions which are not clearly an assessment of abuse. When working with populations younger than 18 years, it is the responsibility of the researcher to make sure they have the clinical expertise to handle cases where evidence of abuse is uncovered during the course of research (*i.e.*, if a case of abuse

needs to be reported to CPS). This may affect which kinds of questions researchers feel capable of asking.

The violence exposure scale for children-revised (VEX-R)

As noted above, the VEX-R was originally designed to be administered to children directly, including young children (e.g., 4–10 years). Children are presented with a cartoon and caption depicting a child of their same sex witnessing each of 22 types of violence (e.g., “Chris sees a person slap another person really hard”) and experiencing that same type of violence (e.g., “A person slaps Chris really hard”). Children are then asked to report how frequently they have witnessed and experienced that type of violence in their own life on a Likert scale. Separate versions exist for males and females and adaptations to Spanish and Hebrew using a more culturally appropriate child’s name also exist (Raviv et al., 1999, 2001). The VEX-R demonstrates adequate convergent validity, internal consistency (Cronbach’s alpha 0.72–0.86), and test–retest reliability (Fox & Leavitt, 1995; Raviv et al., 1999, 2001).

Childhood trauma questionnaire (CTQ)

The CTQ (Bernstein et al., 1994) is a self-report measure designed for use with adolescents and adults to capture childhood experiences of abuse and neglect including physical, emotional, and sexual abuse; physical and emotional neglect; and aspects of the child-rearing environment. This 70-item measure yields four factors: Physical and Emotional Abuse, Emotional Neglect, Sexual Abuse, and Physical Neglect. Items are rated according to frequency on a 5-point Likert-type scale from 1 (*Never True*) to 5 (*Very Often True*). The questionnaire requires 10–15 minutes for administration. A widely used short form with 28 items demonstrated similarly strong psychometric properties as the long form in clinical and community samples (Bernstein et al., 2003). The CTQ is widely used globally and has been translated and adapted for numerous populations including Chinese (Zhao et al., 2005), German (Wingenfeld et al., 2010), Dutch (Thombs et al., 2009), Italian (Sacchi et al., 2018), Spanish (Hernandez et al., 2012), Japanese (Mizuki & Fujiwara, 2021), and Portuguese (Grassi-Oliveira et al., 2006). The CTQ can be administered prospectively to children ages 8 and older as a self-report measure (e.g., Weissman et al., 2019), although children younger than 12 may need to have the items administered verbally by an interviewer. The CTQ has been validated for use in children and adolescents and has good reliability when administered to youth (Bernstein et al., 1997; Forde et al., 2012). Scales appropriate for use in the threat dimension are the subscales of physical, emotional, and sexual abuse.

The juvenile victimization questionnaire (JVQ)

The JVQ can be administered as an interview with children ages 8–17 and as a self-report questionnaire for children above the age of 12. These versions of the JVQ assess the same domains of exposure to violence as the caregiver version, described above. The JVQ demonstrated adequate internal consistency and convergent validity (Finkelhor et al., 2005). See the caregiver-report JVQ section for more details on items and subscales. Scales appropriate for including in the threat dimension are Conventional Crime, Child Maltreatment, Sexual Victimization, and Witnessing.

UCLA posttraumatic stress disorder reaction index (UCLA PTSD RI) for DSM-5

This scale was initially designed as a youth self-report questionnaire to assess trauma exposure and PTSD symptoms in school-

age children and adolescents and is appropriate for use in youths younger than 18. The self-report measure of children has been used with youth as young as 6, although may need to be read to younger children as it is written at an age 12 reading level. Total score on the initial trauma screen is appropriate for inclusion in the threat dimension.

Parent-child conflict tactics scale – revised (CTSPC-R)

This scale was developed to assess psychological and physical abuse from the children’s perspective. It is comprised of 22 items from the CTS-PC and uses age-appropriate pictorial representations of nonviolent discipline, and psychological and physical abuse towards the child in the previous year. Items are rated on a 5-point scale (0 = *Did not occur* to 4 = *Every time*). Visual representations of the five-point scale are provided to allow for pointing instead of a verbal answer. Items are presented in three modules, presented in order from mild to severe. Exposure to harm from multiple caregivers can be evaluated using the measure. The CTSPC-R has demonstrated good internal consistency and convergent validity (Sierau et al., 2018). Scales appropriate for including in the threat dimension are corporal punishment, physical abuse, and sexual abuse.

Retrospective assessment in adulthood of childhood threat experiences

Assessing childhood threat exposure in adults requires that adults accurately recall experiences prior to the age of 18 that involved harm or threat of harm. While experiences of violence are most likely salient events, there are myriad differences in how these events are reported across age (see Baldwin et al., 2019 for a review and meta-analysis) and recall bias is a particular concern with older adults. One way to reduce variability in these reports as a function of age is to use the same measures and informants across different stages of the life-course. As such, we provide suggestions for adult measures that are also appropriate for use with children or caregiver informants. We also provide some additional examples of measures designed for retrospective self-report.

The juvenile victimization questionnaire (JVQ)

The JVQ can be adapted to assess experiences occurring across the entire lifespan, or limited to experiences prior to 18, with adults for retrospective reporting of childhood adversity. A second revision with a reduced number of items, the JVQ-R2 (Finkelhor et al., 2011) is also available as an adult retrospective screener for childhood adversity experiences before the age of 18. Scales appropriate for including in the threat dimension are Conventional Crime, Child Maltreatment, Sexual Victimization, and Witnessing.

Childhood trauma questionnaire (CTQ)

The CTQ (Bernstein et al., 1994) can be administered as a retrospective self-report measure by adults to capture childhood experiences of abuse and neglect. Critically, retrospective assessment of abuse using the CTQ has been validated against prospective assessment of violence exposure during childhood (Lieschutz et al., 2018), suggesting this measure is appropriate for assessing childhood experiences of threat retrospectively. Scales appropriate for use in the threat dimension are the subscales of physical, emotional, and sexual abuse.

UCLA posttraumatic stress disorder reaction index (UCLA PTSD RI)

There is an Adult Retrospective version of the UCLA-PTSD-RI that can be used by individuals older than 18 to report on childhood or lifetime experiences. Total score on the initial trauma screen is appropriate for inclusion in the threat dimension.

Maltreatment and abuse chronology of exposure (MACE)

The MACE (Teicher & Parigger, 2015) is a 52-question self-report measure designed to be used retrospectively with adults. The MACE was validated in young adults ages 18–25, and has been utilized with a full adult range including adults over age 70 (Riedl et al., 2020). The MACE assesses 10 types of adversity experiences in childhood (emotional neglect, non-verbal emotional abuse, parental physical maltreatment, parental verbal abuse, peer emotional abuse, peer physical bullying, physical neglect, sexual abuse, witnessing interparental violence and witnessing violence to siblings). Results yield an overall severity score (0–100) and a multiplicity score (0–10; number of types of maltreatment experienced). The MACE has good reliability and convergent validity (see Teicher & Parigger, 2015). Several translations and cross-cultural adaptations have been validated including for Norwegian (Fosse et al., 2020) and Brazilian Portuguese (Kluwe-Schiavon et al., 2016) populations. The original version of the MACE also queries when adverse experiences happened during each year of childhood, although it can be administered without these timing questions. This retrospective reporting on the timing of adversity experiences sets the MACE apart from other measures. Evidence suggests that this form of reporting in adulthood exhibits good test-retest reliability (Teicher & Parigger, 2015) but no data has assessed the validity of this form of reporting from childhood in adulthood. Scales appropriate for inclusion in the threat dimension are non-verbal emotional abuse, parental physical maltreatment, parental verbal abuse, peer physical bullying, sexual abuse, witnessing interparental violence and witnessing violence to siblings.

Deprivation

Deprivation is defined as a lack of expected experiences of caretaking and cognitive and social stimulation during childhood. Experiences that are assessed in this dimension include neglect, institutionalization, and a lack of invested caregiving due to low resources or caregiver capacity. Conceptually, this is an index of a reduction in (compared to developmentally expected) interactions with a caregiver, which is reflected in our choice of measures. It is possible that investment in cognitive development that occurs outside of the home, such as in schools, can compensate for an absence of such experiences at home. However, to date few self-, parent-, or teacher-report questionnaires exist that assess the amount of cognitive stimulation provided to children in the classroom or other external environments, so we do not address this context of stimulation or deprivation here.

Many instruments that measure violence also include items assessing neglect, including caregiver report measures such as the CTS-PC and self-report measures such as the MACE. We include recommendations for those measures here, as using instruments that assess many aspects of adversity reduces overall burden on participants. However, many of these scales are limited in scope in terms of assessing deprivation. These scales typically assess specific behaviors that constitute neglect (e.g., not bringing a child to the doctor when she is sick), but do not capture the broad range of caregiving experiences that contribute to stimulation and, when absent, reflect deprivation. Thus, we additionally suggest measures

Table 2. Measures of deprivation exposure

Type of exposure	Measure name (authors, year)	Caregiver about child	Child self-report	Adult retrospective
Neglect – legal definition	CTS-PC	✓		
Neglect – expanded	MNBS	✓	✓	✓
Neglect – expanded	MACE			✓
Cognitive enrichment	HOME	✓		
Cognitive enrichment	STIMQ	✓		

that assess a range of caregiving behaviors across the deprivation dimension, such as the Multidimensional Neglectful Behavior Scale (MNBS; Harrington et al., 2002; Kantor et al., 2004b; Straus et al., 1995). Cognitive stimulation and parental involvement in the child's learning are key constructs theorized to comprise the underlying dimension of deprivation. These aspects of the early environment are assessed in the Home Observation for Measurement of the Environment (HOME; Bradley et al., 2001; Bradley & Caldwell, 1977) and StimQ (Mendelsohn et al., 1999). However, these measures were developed for use with young children and are not validated for use as retrospective reporting tools. Retrospective reporting in adulthood on experiences of cognitive stimulation in childhood is not advised. More details about these recommended measures are below. See Table 2 for a summary of recommended measures of deprivation by reporter.

Caregiver report of deprivation in childhood

The conflict tactic scales-parent child (CTS-PC)

The CTS-PC contains a 5-item neglect subscale that assesses the presence of five neglectful behaviors (e.g., left your child alone at home even though you thought they were too young) during the child's lifetime, providing a relatively limited assessment of deprivation. The neglect subscale is the only one which is appropriate for use in the deprivation dimension.

Multidimensional neglectful behavior scale (MNBS)

The MNBS measures the extent to which the child's environment meets four basic developmental needs: physical (food, clothing, shelter, medical care); emotional (e.g., affection, companionship, support); supervisory (e.g., limit setting, attending to misbehavior, knowing child's activities); and cognitive (e.g., reading to child, explaining things). A parent-report version of the MNBS (MNBS-PR; Kantor et al., 2004a) can specify a time period, be asked of multiple caregivers, and be administered via interview or independently completed questionnaire format to parents with a 7th grade or higher reading level (Kantor et al., 2004a; Straus et al., 1995). Kantor's development studies of the MNBS-PR (2003, 2004) utilized a 45-item Likert-type self-report scale administered to mothers and fathers of 10–15-year-old youth. A shorter 10-item form was also validated (Kantor et al., 2004b). A Turkish version of the MNBS-PR was also developed to assess parental neglectful behaviors in a Turkish sample (Beyazit & Ayhan, 2019). The entire MNBS scale is appropriate for inclusion in the deprivation dimension.

Home observation for measurement of the environment (HOME)

The HOME (Bradley & Caldwell, 1977; Bradley et al., 2001) was originally designed as an in-person interview and observation. There are several versions for developmentally-appropriate use across ages. The Infant-Toddler version (IT-HOME; for ages 0–3) contains 45 items, the Early Childhood version (EC-HOME; for ages 3–6) contains 55 items, and the Middle Childhood version (MC-HOME; for ages 6–9) contains 59 items. Because the full version requires direct observation of the home environment, many researchers prefer to use the well-validated short forms of the HOME that can be administered to caregivers as a questionnaire. For example, the Early Childhood HOME-SF (for ages 3–6) consists of 26 items. A total of 15 items are completed by the caregiver, and 11 are completed by the interviewer based on observations of the home environment and parent-child interactions, although the latter items can be excluded if direct home observation is not possible. The HOME-SF yields a cognitive stimulation (14 items) subscale that is most relevant to the deprivation dimension, although some studies have utilized confirmatory factor analysis to identify cognitive stimulation using a slightly different configuration of items (Rosen et al., 2020). See Totsika and Sylva (2004) for review of HOME outcome studies. The HOME demonstrates adequate internal consistency across a variety of populations (Sugland et al., 1995). Note the original version of the HOME questionnaire includes gendered assumptions about family member composition and their roles. Wording should be modified to be inclusive of current family contexts, an upc. All parts of the HOME and HOME-SF, except the questions about physical discipline and parental warmth, are appropriate for use in the deprivation dimension.

StimQ

The StimQ (Mendelsohn et al., 1999) is a caregiver interview designed for use in both clinical and research settings to assess the role of the child's primary caregiver and the home environment in providing cognitive stimulation. Versions vary by age for developmental appropriateness. The StimQ-I (Infant) for 5- to 12-month-olds has 43 items, the StimQ-T (Toddler) for 12- to 36-month-olds has 39 items, and the StimQ-P (Preschool) has 49 items for 36- to 72-month-olds. The StimQ requires approximately 15–20 minutes to administer and 2–3 minutes to score. Results of the StimQ yield 4 subscales: Availability of Learning Materials (e.g., developmentally appropriate toys), READ (e.g., shared reading activities, books in the home), Parental Involvement in Developmental Advance (e.g., frequency and quality of teaching activities), and Parental Verbal Responsivity (e.g., verbal interactions between parents and children). The StimQ provides a detailed assessment of cognitive stimulation appropriate for samples where this construct is central to the research questions. Psychometric analysis shows high internal consistency and test-retest reliability and good convergent validity (Dreyer et al., 1996). All subscales of the StimQ are appropriate for use in the deprivation dimension.

Self-report of deprivation experiences reported in childhood

Multidimensional neglectful behavior scale (MNBS)

The MNBS, originally developed for use with adults, has been adapted for retrospective recall with older youth (e.g., ages 12–14; Dubowitz et al., 2011). Additionally, a child report version (MNBS-CR; Kantor et al., 2004a) was developed for age and

developmentally appropriate administration for children ages 6–15 utilizing pictorials that do not require reading. A multi-media Audio Computer Assisted Self-Administered Interview (ACASI) computer program was developed to test and administer this child report version of the scale (Kantor et al., 2004a). The program is individualized for the models displayed to reflect the reported age and gender of the child, and the gender of the primary caretaker. The full version of the MNBS-CR demonstrated excellent reliability for older children (ages 10–15) but only moderate reliability for young children (ages 6–9) from a clinical neglect sample, as well as good convergent validity (Kantor et al., 2004a). A Turkish adaptation was also validated for the 6–9 year form (Beyazit & Ayhan, 2020) and 10–15 year form (Beyazit & Ayhan, 2019). All subscales of the MNBS are appropriate for use in the deprivation dimension.

Retrospective assessment in adulthood of childhood deprivation experiences

Multidimensional neglectful behavior scale (MNBS)

The MNBS-A (Straus et al., 1995) was originally developed for use with adolescents and adults to retrospectively report on their experiences of neglect across four 5-item subscales assessing physical, emotional, supervisory, and cognitive domains.

Maltreatment and abuse chronology of exposure (MACE)

As described above, the Maltreatment and Abuse Chronology of Exposure (MACE; Teicher & Parigger, 2015) is a 52-question self-report measure, was designed to be used retrospectively with adults. The MACE assesses 10 types of adversity experiences in childhood, with two of these subscales appropriate for measuring deprivation (i.e., emotional neglect, physical neglect).

An alternate approach to retrospective reporting of deprivation

As previously articulated, assessment of adversity experiences in adult populations is rife with complications, where previous exposures can both be missed early in development and reported on later or reported on accurately early in development but not described later. Carmel and Widom (2020) recently developed measure to address this concern specifically in the area of severe neglect. Development of this measure included Support Vector Machine (SVM), a machine learning algorithm, to select an optimal set of items. The final measure consists of 10 items to retrospectively assess neglect experiences and identify adults who suffered severe neglect who may not have been identified or treated at the time. The scale assessed the domains of medical neglect (e.g., dental problems, lacking hygiene); nutritional neglect (e.g., untreated food spoilage), shelter (e.g., unfixed broken windows); guardianship (e.g., left home alone). This measure also collects information about severity and diversity, and propensity (likelihood of having an experience) of experiences. Propensity scores demonstrated strong predictive, construct, and discriminant validity, while the severity and diversity scores each only passed 2 of the 3 validity tests. Thus far, to our knowledge, this measure has been used and cited in one 2021 peer-reviewed publication (Morris et al., 2021).

Official records of maltreatment experiences

The maltreatment classification system (MCS)

The MCS (Barnett et al., 1993, later updated to the Modified MCS; English et al., 2005) is a nosological system that was developed to quantify children's experience of maltreatment along multiple

dimensions based on child protective service (CPS) records. This system organizes information regarding subtype (i.e., neglect, emotional maltreatment, physical abuse, sexual abuse), timing of maltreatment (age of onset, frequency, chronicity, developmental period), relationship of perpetrator(s), occurrence of separations and placements, and severity of maltreatment indices. Using the operational definitions provided for each subtype, researchers can code archival data.

MCS utilizes information from CPS descriptive narratives and therefore will not capture experiences that were not reported, either because these events were never reported to authorities or because they were adverse experiences that typically do not warrant CPS involvement (e.g., community violence). MCS coding can also be applied to the Maternal Maltreatment Classification Interview (MMCI; Cicchetti *et al.*, 2003), which may provide different information as it is a semi-structured interview with the primary caregiver about a child's abuse and family's contact with CPSs. Though the MCS relies exclusively on previously reported incidents, benefits of using archival recorded data include availability of data without additional burden to families, the presence of information about younger children who cannot self-report, and the reduction in memory biases for past events (Manly, 2005). This classification system has also been used broadly, which yields results that may be comparable across studies.

Official reports (e.g., CPSs records) can be an important source of information about exposure to adversities that involve child maltreatment (i.e., abuse and neglect). These sources have a high degree of veracity for documented exposures, but many experiences, such as harsh punishment or community violence, are legal and would not be captured in these sources. In addition, typically only severe forms of maltreatment come to the attention of legal authorities, meaning that many cases of maltreatment are neither reported, nor substantiated, and therefore are not reflected in CPS records. The MCS has been used less frequently to create dimensional measures of the frequency and severity of maltreatment experiences but could theoretically be used to construct such measures.

Conclusions and future directions

As new ideas in the field of adversity emerge, researchers must find ways to measure and test their concepts. Accumulative evidence supports recently developed dimensional models of early-life adversity and their utility in identifying mechanisms linking these experiences with psychopathology (McLaughlin *et al.*, 2021). However, no measure currently exists that measures adversity exposure as a dimension. One particularly salient question is, given current resources, how do we measure these dimensions of experience? This paper is a response to that question. Here we provide guidance for researchers interested in assessing the dimensions of threat and deprivation using previously validated measures of adversity. This document can also guide researchers so that existing datasets where measurement was conceptualized and sometimes executed years ago, can be used to answer new dimensional questions about adversity exposure (e.g., Miller *et al.*, 2018, 2020). Herein, we primarily focused on which measures can be used to assess experiences which fall into the category of threat and others which fall into the category of deprivation.

Many exposures that would be considered adversity (e.g., maternal mental illness, parental incarceration, parental substance abuse, severe car accidents) are not included in these dimensions. This is because, while these are adverse experiences, and likely have

negative effects on child outcomes, they are either not specifically a deprivation or threat experience (e.g., car crash); while they may be weakly predictive of deprivation or threat experiences, their occurrence does not indicate with surety that such experiences have occurred (e.g., parental substance abuse does not necessitate harm or neglect has occurred to the child). The dimensional model of adversity and psychopathology (DMAP) specifically focuses on the impact of deprivation and threat on proximal outcomes (Sheridan & McLaughlin, 2016b) which increase risk for most forms of psychopathology (McTeague *et al.*, 2016). Thus, these other forms of adversity which may increase risk for psychopathology via other mechanisms are not considered here. However, if they are measured, they can be used as additional control variables (see for example, McGinnis, Sheridan & Copeland, *this issue*).

Measurement is not always perfect and some existing publications have defined deprivation and threat in sub-optimal ways to take advantage of novel longitudinal data, or special populations. In initial work with the DMAP hypothesis we, for example, used low parental socioeconomic status (SES) as an indicator of deprivation (Sheridan *et al.*, 2017). In subsequent analyses we have treated low SES as an exposure which increases risk for experiences of deprivation and threat but which is not synonymous with either deprivation or threat exposure (Miller *et al.*, 2018). Further, in multiple papers, we now show that when measured, deprivation or threat exposures partially account for the impact of low SES on predicted outcomes such as executive function, language, or emotion reactivity (Rosen *et al.*, 2018, 2020). Thus, our initial use of SES as an indicator of deprivation was likely sub-optimal; future work should seek direct measures of deprivation or threat experiences and not rely on distal predictors of those experiences. For a comprehensive discussion about experiences and exposures please see McLaughlin *et al.* (2020).

Another example of sub-optimal construction of variables is to measure one experience, for instance neglect or physical abuse, and then to conceptualize this as a dimension (i.e. using exposure to neglect as a proxy for the dimension of deprivation). This approach is at odds with the idea of a dimension, which includes the conceptualization of degree within it. Unfortunately, this approach has been fairly common, as existing datasets only rarely have multiple indicators of adversity exposure. This has sometimes led to confusion about dimensional aspects of the approach we advocate (e.g., Smith & Pollak, 2020). In existing work in which dimensions have been assessed more comprehensively, multiple exposures have been measured using several different assessment tools, similar to what we propose in this review (e.g., Machlin *et al.*, 2019). As we advocate here, these researchers measure experiences of multiple different kinds of threat (e.g., physical abuse, sexual abuse, community violence) or deprivation (e.g., neglect, low parental stimulation, material deprivation) and then aggregate across these different exposures.

Creating dimensional composites

Given that the measures suggested in this article, and used in previous studies, were not designed specifically to measure threat and deprivation in the way they are conceptualized in theoretical models, they must be combined into a composite variable. This can be approached in a variety of ways. One way to create a composite from these measures is to create a 'cut off' score for number of exposures whereby an experience is determined to be 'present.' For example, if a participant reports sufficient instances of physical abuse on the CTQ to have a score in the 'clinically significant'

range, they would be counted as having a physical abuse experience. If several types of experiences are measured, the presence of each can be defined as “present” or “absent,” then the overall number of ‘present’ experiences summed together to create a composite score for each domain (Miller et al., 2018). Creating a variety score that reflects the number of distinct types of exposures that have occurred within a specific dimension (e.g., a count of exposure to physical abuse, sexual abuse, domestic violence, and community violence to approximate the dimension of threat) is essentially a cumulative risk score specific to each dimension. In this approach a degree of severity is ‘baked in’ to the measure. For a participant to get a score of 1 or greater, they need to have some clinically relevant level of exposure. We refer to ‘clinically significant’ here to avoid over-pathologizing a wider range of typically occurring experiences of threat or harm (e.g., hit without an object by anyone, including a sibling). However, this method also introduces ambiguity that should be approached intentionally: the range of scores is determined by the range of measured exposures. Further, note this approach still retains some of the problems of cumulative risk measures (e.g., artifactual distinctions and grey areas between the presence vs absence of an experience; Evans et al., 2013).

Another approach is to take a mean or sum of standardized scores from multiple scales (Machlin et al., 2019). This approach has the advantage that you get the full range of each participants’ experience averaged together and specific categories of exposure do not need to be defined. However, to combine across multiple scales in this way requires that scores be standardized, usually within the study’s sample. In this case, sample characteristics can impact the construction of the dimension. For example, if a sample is largely privileged and few individuals have adversity exposure, a person with relatively low adversity exposure could statistically have a high score as a result of standardization within the sample. However, if an adversity score created in this way, with a privileged sample was used as a predictor of other outcomes, because there is little actual exposure to adversity, expected associations may not be observed.

Finally, one option which might seem like an obvious choice is a latent variable approach such as factor analysis (see Miller et al., 2020 for an example). Unfortunately, factor analysis specifically, requires a theoretical latent variable which is identified by the degree of co-occurrence among like measures. In the case of constructing deprivation and threat dimensions, these assumptions aren’t met. For example, neglect and physical abuse are likely to co-occur more than, for example, physical abuse and community violence. However, we propose that physical abuse and community violence to be on one dimension (threat) and neglect to be on another (deprivation) based not on their co-occurrence, but on the experiences they represent. For an extensive description of this problem and a novel solution, see Sheridan et al. (2020). Overall, we do not recommend a latent variable approach.

Another class of problems can arise when utilizing a combination of items across various measures and information from multiple informants (e.g., self-report, caregiver report). As is the case in many other domains, information from different reporters frequently does not align well (Skar et al., 2021). In many instances, we have found variance in reporting on experiences (e.g., being hit as a form of punishment) across measures when the same individual is reporting about the same experience type on multiple measures, as well as across informants, who are using different versions (e.g., child self-report and caregiver report on child) of the same measure. Specifically in the context of adversity, each reporter

may have various motivations for sharing or not sharing experiences (e.g., privacy, shame/embarrassment, desire to share or seek help, fear of consequences) and/or may not all be aware of the same events. Small differences in the wording of questions can lead to this kind of stochastic variation. When combining multiple reports, we generally recommend an “or” rule, otherwise known as an “if yes in any case, mark as yes” approach to dealing with this common problem. Following this rule, an endorsement by any informant on any measure would be sufficient to count that experience as “present,” despite conflictual responses. When considering sources of bias in childhood adversity reports, evidence suggests that false negatives are common, but false positives (i.e., endorsing adversity that did not occur) are rare (Hardt & Rutter, 2004). Thus, we believe that this approach is likely to yield the best estimate of exposure, however, we know of no projects which have systematically compared potential solutions to this conundrum to determine the best approach.

Relatedly, and as mentioned above and explored in numerous papers, differences in reporters (Cooley & Jackson, 2020; Goodman et al., 2010; Newbury et al., 2018) and prospective versus retrospective assessment (e.g., 2019, Baldwin et al., 2019; Hardt & Rutter, 2004; Herrenkohl et al., 2021; Liebschutz et al., 2018; Naicker et al., 2017; Shaffer et al., 2008; Tajima et al., 2004; Widom et al., 2004), result in different estimates of exposure to adversity. Thus, benefits and limitations of these measurement approaches should be considered when selecting measures and interpreting findings.

One clear limitation of the proposed measures and the dimensional approaches which inspired their identification is that they do little to examine the importance of timing of exposure to adversity. Robust evidence suggests that timing of exposure to adversity is likely to influence the degree to which it shifts subsequent developmental trajectories (Fox et al., 2010; Gabard-Durnam & McLaughlin, 2020). It is similarly likely that timing of exposure to deprivation and threat experiences influences the degree to which they shift risk for proximal outcomes; future longitudinal or intervention work will most easily address this question. It is our hope that this guide to measurement can facilitate that kind of research in existing datasets. Additional aspects of adversity which may be central to identifying their impact on outcomes is the perceived severity of the experiences or the proximity (and relationship to) the offender. Current dimensional models do not explicitly suggest that differences in the impact of adversity by these kinds of variables will occur, thus we do not make specific measurement suggestions with regards to them here.

In summary, while the measurements suggested here are not an exhaustive list of psychometrically sound assessments of threat and deprivation indicators, they are a list of useful tools that can capture dimensions of adversity in upcoming and existing datasets. As mentioned previously, we underscore that care and consideration should be taken when selecting measurements based on format of administration, respondents available, age of youth (when applicable), and compared to each other prior to administration to avoid duplication of questions and ensure attention to participant burden in number of questions. Finally, as the existing review makes clear, developing a new measurement tool to assess dimensions of early experience may simplify study design and facilitate future research. We feel this is an important next step.

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References

- Baldwin, J. R., Caspi, A., Meehan, A. J., Ambler, A., Arseneault, L., Fisher, H. L., Harrington, H., Matthews, T., Odgers, C. L., Poulton, R., Ramrakha, S., Moffitt, T. E., & Danese, A. (2021). Population vs individual prediction of poor health from results of adverse childhood experiences screening. *JAMA Pediatrics*, *175*(4), 385–393. <https://doi.org/10.1001/jamapediatrics.2020.5602>
- Baldwin, J. R., Reuben, A., Newbury, J. B., & Danese, A. (2019). Agreement between prospective and retrospective measures of childhood maltreatment: A systematic review and Meta-analysis. *JAMA Psychiatry*, *76*(6), 584–593. <https://doi.org/10.1001/jamapsychiatry.2019.0097>
- Baram, T. Z., Davis, E. P., Obenaus, A., Sandman, C. A., Small, S. L., Solodkin, A., & Stern, H. (2012). Fragmentation and unpredictability of early-life experience in mental disorders. *The American Journal of Psychiatry*, *169*(9), 907–915. <https://doi.org/10.1176/appi.ajp.2012.11091347>
- Barnett, D., Manly, J. T., & Cicchetti, D. (1993). Defining child maltreatment: The interface between policy and research. In D. Cicchetti, & S. L. Toth (Eds.), *Child abuse, child development, and social policy: Advances in applied developmental psychology* (Vol. 8). Ablex Publishing Corporation.
- Belsky, J., & de Haan, M. (2011). Annual research review: Parenting and children's brain development: the end of the beginning. *Journal of Child Psychology and Psychiatry*, *52*(4), 409–428. <https://doi.org/10.1111/j.1469-7610.2010.02281.x>
- Belsky, J., Schlomer, G., & Ellis, B. (2011). Beyond cumulative risk: Distinguishing harshness and unpredictability as determinants of parenting and early life history strategy. *Developmental Psychology*, *48*, 662–673. <https://doi.org/10.1037/a0024454>
- Belsky, J., Schlomer, G. L., & Ellis, B. J. (2012). Beyond cumulative risk: Distinguishing harshness and unpredictability as determinants of parenting and early life history strategy. *Developmental Psychology*, *48*(3), 662–673. <https://doi.org/10.1037/a0024454>
- Bernstein, D. P., Ahluvalia, T., Pogge, D., & Handelsman, L. (1997). Validity of the Childhood Trauma Questionnaire in an adolescent psychiatric population. *Journal of the American Academy of Child and Adolescent Psychiatry*, *36*(3), 340–348. <https://doi.org/10.1097/00004583-199703000-00012>
- Bernstein, D. P., Fink, L., Handelsman, L., Foote, J., Lovejoy, M., Wenzel, K., Sapareto, E., & Ruggiero, J. (1994). Initial reliability and validity of a new retrospective measure of child abuse and neglect. *American Journal of Psychiatry*, *151*(8), 1132–1136. <https://doi.org/10.1176/ajp.151.8.1132>
- Bernstein, D. P., Stein, J. A., Newcomb, M. D., Walker, E., Pogge, D., Ahluvalia, T., Stokes, J., Handelsman, L., Medrano, M., Desmond, D., & Zule, W. (2003). Development and validation of a brief screening version of the Childhood Trauma Questionnaire. *Child Abuse and Neglect*, *27*(2), 169–190. [https://doi.org/10.1016/S0145-2134\(02\)00541-0](https://doi.org/10.1016/S0145-2134(02)00541-0)
- Bayazit, U., & Ayhan, A. B. (2019). The psychometric properties of the Turkish version of the multidimensional neglectful behavior scale-parents form. *Current Psychology*, *38*(5), 1121–1130. <https://doi.org/10.1007/s12144-018-9817-7>
- Bayazit, U., & Ayhan, A. B. (2020). The Turkish version of the 6–9 years form of the multidimensional neglectful behavior scale-child report: Validity and reliability studies. *Current Psychology*, *88*(1), 38. <https://doi.org/10.1007/s12144-020-00979-8>
- Bradley, R. H., & Caldwell, B. M. (1977). Home observation for measurement of the environment: A validation study of screening efficiency. *American Journal of Mental Deficiency*, *81*(5), 417–420.
- Bradley, R. H., Corwyn, R. F., McAdoo, H. P., & Coll, C. G. (2001). The home environments of children in the United States part I: Variations by age, ethnicity, and poverty status. *Child Development*, *72*(6), 1844–1867.
- Carmel, T., & Widom, C. S. (2020). Development and validation of a retrospective self-report measure of childhood neglect. *Child Abuse & Neglect*, *106*, 104555. <https://doi.org/10.1016/j.chiabu.2020.104555>
- Cicchetti, D., Toth, S. L., & Manly, J. T. (2003). Maternal Maltreatment Classification Interview. Unpublished manuscript. Rochester, NY: Mt Hope Family Center.
- Colich, N. L., Rosen, M. L., Williams, E. S., & McLaughlin, K. A. (2020). Biological aging in childhood and adolescence following experiences of threat and deprivation: A systematic review and meta-analysis. *Psychological Bulletin*, *146*(9), 721–764. <https://doi.org/10.1037/bul0000270>
- Cooley, D. T., & Jackson, Y. (2020). Informant discrepancies in child maltreatment reporting: A systematic review. *Child Maltreatment*, *1077559520966387*. <https://doi.org/10.1177/1077559520966387>
- Danese, A., & McEwen, B. S. (2012). Adverse childhood experiences, allostasis, allostatic load, and age-related disease. *Physiology & Behavior*, *106*(1), 29–39. <https://doi.org/10.1016/j.physbeh.2011.08.019>
- Danese, A., Pariante, C. M., Caspi, A., Taylor, A., & Poulton, R. (2007). Childhood maltreatment predicts adult inflammation in a life-course study. *Proceedings of the National Academy of Sciences of the United States of America*, *104*(4), 1319–1324. <https://doi.org/10.1073/pnas.0610362104>
- Danese, A., & Widom, C. S. (2020). Objective and subjective experiences of child maltreatment and their relationships with psychopathology. *Nature Human Behaviour*, *4*(8), 811–818. <https://doi.org/10.1038/s41562-020-0880-3>
- David, K. B., LeBlanc, M. M., & Self-Brown, S. (2015). Violence exposure in young children: Child-oriented routines as a protective factor for school readiness. *Journal of Family Violence*, *30*(3), 303–314. <https://doi.org/10.1007/s10896-015-9676-z>
- Davis, E. P., Stout, S. A., Molet, J., Vegetabile, B., Glynn, L. M., Sandman, C. A., Heins, K., Stern, H., & Baram, T. Z. (2017). Exposure to unpredictable maternal sensory signals influences cognitive development across species. *Proceedings of the National Academy of Sciences of the United States of America*, *114*(39), 10390–10395. <https://doi.org/10.1073/pnas.1703444114>
- Dong, M., Anda, R. F., Felitti, V. J., Dube, S. R., Williamson, D. F., Thompson, T. J., Loo, C. M., & Giles, W. H. (2004). The interrelatedness of multiple forms of childhood abuse, neglect, and household dysfunction. *Child Abuse & Neglect*, *28*(7), 771–784. <https://doi.org/10.1016/j.chiabu.2004.01.008>
- Dreyer, B. P., Mendelsohn, A. L., & Tamis-LeMonda, C.S. (1996). Assessing the child's cognitive home environment through parental report: Reliability and validity. *Early Development and Parenting*, *5*, 271–287.
- Dubowitz, H., Kim, J., Black, M. M., Weisbart, C., Semiatin, J., & Magder, L. S. (2011). Identifying children at high risk for a child maltreatment report. *Child Abuse & Neglect*, *35*(2), 96–104. <https://doi.org/10.1016/j.chiabu.2010.09.003>
- Ellis, B. J., Figueredo, A. J., Brumbach, B. H., & Schlomer, G. L. (2009). Fundamental dimensions of environmental risk: The impact of harsh versus unpredictable environments on the evolution and development of life history strategies. *Human Nature (Hawthorne, N.Y.)*, *20*(2), 204–268. <https://doi.org/10.1007/s12110-009-9063-7>
- English, D. J., Bangdiwala, S. I., & Runyan, D. K. (2005). The dimensions of maltreatment: Introduction. *Child Abuse & Neglect*, *29*(5), 441–460. <https://doi.org/10.1016/j.chiabu.2003.09.023>
- Evans, G. W., Li, D., & Whipple, S. S. (2013). Cumulative risk and child development. *Psychological Bulletin*, *139*(6), 1342–1396. <https://doi.org/10.1037/a0031808>
- Felitti, V. J., Anda, R. F., Nordenberg, D., Williamson, D. F., Spitz, A. M., Edwards, V., Koss, M. P., & Marks, J. S. (1998). Relationship of childhood abuse and household dysfunction to many of the leading causes of death in

- adults. *American Journal of Preventive Medicine*, 14(4), 245–258. [https://doi.org/10.1016/S0749-3797\(98\)00017-8](https://doi.org/10.1016/S0749-3797(98)00017-8)
- Finkelhor, D., Hamby, S., Turner, H., & Ormrod, R. (2011). *The juvenile victimization questionnaire: 2nd revision (JVQ-R2)*. Crimes Against Children Research Center.
- Finkelhor, D., Ormrod, R., Turner, H., & Hamby, S. L. (2005). The victimization of children and youth: A comprehensive, national survey. *Child Maltreatment*, 10(1), 5–25. <https://doi.org/10.1177/1077559504271287>
- Finkelhor, D., Shattuck, A., Turner, H., & Hamby, S. (2013). Improving the adverse childhood experiences study scale. *JAMA Pediatrics*, 167(1), 70–75. <https://doi.org/10.1001/jamapediatrics.2013.420>
- Forde, D. R., Baron, S. W., Scher, C. D., & Stein, M. B. (2012). Factor structure and reliability of the childhood trauma questionnaire and prevalence estimates of trauma for male and female street youth. *Journal of Interpersonal Violence*, 27(2), 364–379. <https://doi.org/10.1177/0886260511416461>
- Fosse, R., Skjelstad, D. V., Schalinski, I., Thekkumthala, D., Elbert, T., Aanonsen, C. M., Greger, H. K., & Jozefiak, T. (2020). Measuring childhood maltreatment: Psychometric properties of the Norwegian version of the Maltreatment and Abuse Chronology of Exposure (MACE) scale. *PLOS ONE*, 15(2), e0229661. <https://doi.org/10.1371/journal.pone.0229661>
- Fox, N. A., & Leavitt, L. A. (1995). *Violence Exposure Scale – Revised (VEX-R)* (p. 65). Department of Health Development, University of Maryland.
- Fox, S. E., Levitt, P., & Nelson, C. A. (2010). How the timing and quality of early experiences influence the development of brain architecture. *Child Development*, 81(1), 28–40. <https://doi.org/10.1111/j.1467-8624.2009.01380.x>
- Gabard-Durnam, L., & McLaughlin, K. A. (2020). Sensitive periods in human development: Charting a course for the future. *Current Opinion in Behavioral Sciences*, 36, 120–128. <https://doi.org/10.1016/j.cobeha.2020.09.003>
- Geoffroy, M.-C., Pereira, S. P., Li, L., & Power, C. (2016). Child neglect and maltreatment and childhood-to-adulthood cognition and mental health in a prospective birth cohort. *Journal of the American Academy of Child and Adolescent Psychiatry*, 55(1), 33–40.e3. <https://doi.org/10.1016/j.jaac.2015.10.012>
- Glynn, L., Stern, H., Howland, M., Risbrough, V., Baker, D., Nievergelt, C., Baram, T., & Davis, E. (2018). Measuring novel antecedents of mental illness: The questionnaire of unpredictability in childhood. *Psychology Faculty Articles and Research*. <https://doi.org/10.1038/s41386-018-0280-9>
- Goodman, K. L., De Los Reyes, A., & Bradshaw, C. P. (2010). Understanding and using informants' reporting discrepancies of youth victimization: A conceptual model and recommendations for research. *Clinical Child and Family Psychology Review*, 13(4), 366–383. <https://doi.org/10.1007/s10567-010-0076-x>
- Grassi-Oliveira, R., Stein, L. M., & Pezzi, J. C. (2006). Tradução e validação de conteúdo da versão em português do Childhood Trauma Questionnaire. *Revista de Saúde Pública*, 40, 249–255. <https://doi.org/10.1590/S0034-89102006000200010>
- Grummitt, L. R., Kreski, N. T., Kim, S. G., Platt, J., Keyes, K. M., & McLaughlin, K. A. (2021). Association of childhood adversity with morbidity and mortality in US adults: A systematic review. *JAMA Pediatrics*, 175(12), 1269. <https://doi.org/10.1001/jamapediatrics.2021.2320>
- Hardt, J., & Rutter, M. (2004). Validity of adult retrospective reports of adverse childhood experiences: Review of the evidence. *Journal of Child Psychology and Psychiatry, and Allied Disciplines*, 45(2), 260–273. <https://doi.org/10.1111/j.1469-7610.2004.00218.x>
- Harrington, D., Zuravin, S., DePanfilis, D., Ting, L., & Dubowitz, H. (2002). The neglect scale: Confirmatory factor analyses in a low-income sample. *Child Maltreatment*, 7(4), 359–368. <https://doi.org/10.1177/107755902237266>
- Hernandez, A., Gallardo-Pujol, D., Pereda, N., Arntz, A., Bernstein, D., Gaviña Gómez, A., Labad, A., Valero, J., & Gutierrez-Zotes, A. (2012). Initial validation of the Spanish Childhood Trauma Questionnaire-short form: Factor structure, reliability and association with parenting, reliability and association with parenting. *Journal of Interpersonal Violence*, 28. <https://doi.org/10.1177/0886260512468240>
- Herrenkohl, T. I., Fedina, L., Hong, S. H., Lee, J. O., & Saba, S. (2021). Associations between prospective and retrospective measures of child abuse and self-reported adult health at midlife. *Child Abuse & Neglect*, 120, 105203. <https://doi.org/10.1016/j.chiabu.2021.105203>
- Hertzman, C., & Boyce, T. (2009). How experience gets under the skin to create gradients in developmental health. *Annual Review of Public Health*. <https://doi.org/10.1146/annurev.publhealth.012809.103538>
- Humphreys, K. L., Gleason, M. M., Drury, S. S., Miron, D., Nelson, C. A., Fox, N. A., & Zeanah, C. H. (2015). Effects of institutional rearing and foster care on psychopathology at age 12 years in Romania: Follow-up of an open, randomised controlled trial. *The Lancet. Psychiatry*, 2(7), 625–634. [https://doi.org/10.1016/S2215-0366\(15\)00095-4](https://doi.org/10.1016/S2215-0366(15)00095-4)
- Humphreys, K. L., & Zeanah, C. H. (2015a). Deviations from the expectable environment in early childhood and emerging psychopathology. *Neuropsychopharmacology*, 40(1), 154–170. <https://doi.org/10.1038/npp.2014.165>
- Humphreys, K. L., & Zeanah, C. H. (2015b). Deviations from the expectable environment in early childhood and emerging psychopathology. *Neuropsychopharmacology: Official Publication of the American College of Neuropsychopharmacology*, 40(1), 154–170. <https://doi.org/10.1038/npp.2014.165>
- Jenness, J. L., Peverill, M., Miller, A. B., Heleniak, C., Robertson, M. M., Sambrook, K. A., Sheridan, M. A., & McLaughlin, K. A. (2020). Alterations in neural circuits underlying emotion regulation following child maltreatment: A mechanism underlying trauma-related psychopathology. *Psychological Medicine*, 1–10. <https://doi.org/10.1017/S0033291720000641>
- Kantor, G. K., Holt, M. K., Mebert, C. J., Straus, M. A., Drach, K. M., Ricci, L. R., Macallum, C. A., & Brown, W. (2004a). *The parent-report multidimensional neglectful behavior scale*.
- Kantor, G. K., Holt, M. K., Mebert, C. J., Straus, M. A., Drach, K. M., Ricci, L. R., MacAllum, C. A., & Brown, W. (2004b). Development and preliminary psychometric properties of the multidimensional neglectful behavior scale-child report. *Child Maltreatment*, 9(4), 409–428. <https://doi.org/10.1177/1077559504269530>
- Kluwe-Schiavon, B., Viola, T. W., & Grassi-Oliveira, R. (2016). Cross-cultural adaptation of the Maltreatment and Abuse Chronology of Exposure (MACE) scale to Brazilian Portuguese. *Trends in Psychiatry and Psychotherapy*, 38(1), 33–39. <https://doi.org/10.1590/2237-6089-2015-0051>
- Lanier, P., Maguire-Jack, K., Lombardi, B., Frey, J., & Rose, R. A. (2018). Adverse childhood experiences and child health outcomes: Comparing cumulative risk and latent class approaches. *Maternal and Child Health Journal*, 22(3), 288–297. <https://doi.org/10.1007/s10995-017-2365-1>
- Liebschutz, J. M., Buchanan-Howland, K., Chen, C. A., Frank, D. A., Richardson, M. A., Heeren, T. C., Cabral, H. J., & Rose-Jacobs, R. (2018). Childhood Trauma Questionnaire (CTQ) correlations with prospective violence assessment in a longitudinal cohort. *Psychological Assessment*, 30(6), 841–845. <https://doi.org/10.1037/pas0000549>
- Machlin, L., Miller, A. B., Snyder, J., McLaughlin, K. A., & Sheridan, M. A. (2019). Differential associations of deprivation and threat with cognitive control and fear conditioning in early childhood. *Frontiers in Behavioral Neuroscience*, 13. <https://doi.org/10.3389/fnbeh.2019.00080>
- Manly, J. T. (2005). Advances in research definitions of child maltreatment. *Child Abuse & Neglect*, 29(5), 425–439. <https://doi.org/10.1016/j.chiabu.2005.04.001>
- McEwen, B. S., & Gianaros, P. J. (2010). Central role of the brain in stress and adaptation: Links to socioeconomic status, health, and disease. *Annals of the New York Academy of Sciences*, 1186, 190–222. <https://doi.org/10.1111/j.1749-6632.2009.05331.x>
- McEwen, C. A. (2019). A critical assessment of the adverse childhood experiences study at 20 years. *American Journal of Preventive Medicine*, 56(6), 790–794.
- McLaughlin, K. A., & Gabard-Durnam, L. J. (2021). Experience-driven plasticity and the emergence of psychopathology: A mechanistic framework integrating development and the environment into the research domain criteria (RDoC) model. *PsyArXiv*. <https://doi.org/10.31234/osf.io/nue3d>
- McLaughlin, K. A., & Lambert, H. K. (2017). Child trauma exposure and psychopathology: Mechanisms of risk and resilience. *Current Opinion in Psychology*, 14, 29–34. <https://doi.org/10.1016/j.copsyc.2016.10.004>

- McLaughlin, K. A., Sheridan, M., Humphreys, K., Belsky, J., & Ellis, B. J. (2020). The value of dimensional models of early experience: Thinking clearly about concepts and categories. *PsyArXiv*. <https://doi.org/10.31234/osf.io/29fmt>
- McLaughlin, K. A., & Sheridan, M. A. (2016). Beyond cumulative risk: A dimensional approach to childhood adversity. *Current Directions in Psychological Science*, 25(4), 239–245. <https://doi.org/10.1177/0963721416655883>
- McLaughlin, K. A., Sheridan, M. A., Humphreys, K. L., Belsky, J., & Ellis, B. J. (2021). The value of dimensional models of early experience: Thinking clearly about concepts and categories. *Perspectives on Psychological Science*, 16(6), 1463–1472. <https://doi.org/10.1177/1745691621992346>
- McLaughlin, K. A., Sheridan, M. A., & Lambert, H. K. (2014). Childhood adversity and neural development: Deprivation and threat as distinct dimensions of early experience. *Neuroscience & Biobehavioral Reviews*, 47, 578–591. <https://doi.org/10.1016/j.neubiorev.2014.10.012>
- McLaughlin, K. A., Weissman, D., & Bitrán, D. (2019). Childhood adversity and neural development: A systematic review. *Annual Review of Developmental Psychology*, 1, 277–312. <https://doi.org/10.1146/annurev-devpsych-121318-084950>
- McTeague, L. M., Goodkind, M. S., & Etkin, A. (2016). Transdiagnostic impairment of cognitive control in mental illness. *Journal of Psychiatric Research*, 83, 37–46. <https://doi.org/10.1016/j.jpsychires.2016.08.001>
- Mendelsohn, A. L., Dreyer, B. P., Tamis-LeMonda, C. S., & Ahuja, P. (1999). Validity of StimQ, a scale for assessing the cognitive home environment. *Journal of Developmental & Behavioral Pediatrics*, 20(5), 399.
- Miller, A. B., Machlin, L., McLaughlin, K. A., & Sheridan, M. A. (2020). Deprivation and psychopathology in the Fragile Families Study: A 15-year longitudinal investigation. *Journal of Child Psychology and Psychiatry*. <https://doi.org/10.1111/jcpp.13260>
- Miller, A. B., Machlin, L., McLaughlin, K. A., & Sheridan, M. A. (2021). Deprivation and psychopathology in the Fragile Families Study: A 15-year longitudinal investigation. *Journal of Child Psychology and Psychiatry*, 62(4), 382–391.
- Miller, A. B., Sheridan, M. A., Hanson, J. L., McLaughlin, K. A., Bates, J. E., Lansford, J. E., Pettit, G. S., & Dodge, K. A. (2018). Dimensions of deprivation and threat, psychopathology, and potential mediators: A multi-year longitudinal analysis. *Journal of Abnormal Psychology*, 127(2), 160–170. <https://doi.org/10.1037/abn0000331>
- Miller, G. E., Chen, E., & Parker, K. J. (2011). Psychological stress in childhood and susceptibility to the chronic diseases of aging: Moving towards a model of behavioral and biological mechanisms. *Psychological Bulletin*, 137(6), 959–997. <https://doi.org/10.1037/a0024768>
- Mizuki, R., & Fujiwara, T. (2021). Validation of the Japanese version of the Childhood Trauma Questionnaire—short form (CTQ-J). *Psychological Trauma: Theory, Research, Practice, and Policy*, 13(5), 537–544. <https://doi.org/10.1037/tra0000972>
- Morris, A. S., Hays-Grudo, J., Zapata, M. I., Treat, A., & Kerr, K. L. (2021). Adverse and protective childhood experiences and parenting attitudes: The role of cumulative protection in understanding resilience. *Adversity and Resilience Science*, 1–12. <https://doi.org/10.1007/s42844-021-00036-8>
- Muennig, P., Schweinhart, L., Montie, J., & Neidell, M. (2009). Effects of a prekindergarten educational intervention on adult health: 37-year follow-up results of a randomized controlled trial. *American Journal of Public Health*, 99(8), 1431–1437. <https://doi.org/10.2105/AJPH.2008.148353>
- Naicker, S. N., Norris, S. A., Mabaso, M., & Richter, L. M. (2017). An analysis of retrospective and repeat prospective reports of adverse childhood experiences from the South African Birth to Twenty Plus cohort. *PLOS ONE*, 12(7), e0181522. <https://doi.org/10.1371/journal.pone.0181522>
- Nelson, C. A., & Gabard-Durnam, L. J. (2020). Early adversity and critical periods: Neurodevelopmental consequences of violating the expectable environment. *Trends in Neurosciences*, 43(3), 133–143. <https://doi.org/10.1016/j.tins.2020.01.002>
- Newbury, J. B., Arseneault, L., Moffitt, T. E., Caspi, A., Danese, A., Baldwin, J. R., & Fisher, H. L. (2018). Measuring childhood maltreatment to predict early-adult psychopathology: Comparison of prospective informant-reports and retrospective self-reports. *Journal of Psychiatric Research*, 96, 57–64. <https://doi.org/10.1016/j.jpsychires.2017.09.020>
- Pereira, S. M. P., Stein Merkin, S., Seeman, T., & Power, C. (2019). Understanding associations of early-life adversities with mid-life inflammatory profiles: Evidence from the UK and USA. *Brain, Behavior, and Immunity*, 78, 143–152. <https://doi.org/10.1016/j.bbi.2019.01.016>
- Pollak, S. D., Cicchetti, D., Hornung, K., & Reed, A. (2000). Recognizing emotion in faces: Developmental effects of child abuse and neglect. *Developmental Psychology*, 36(5), 679–688. <https://doi.org/10.1037/0012-1649.36.5.679>
- Pollak, S. D., Messner, M., Kistler, D. J., & Cohn, J. F. (2009). Development of perceptual expertise in emotion recognition. *Cognition*, 110(2), 242–247. <https://doi.org/10.1016/j.cognition.2008.10.010>
- Pollak, S. D., & Tolley-Schell, S. A. (2003). Selective attention to facial emotion in physically abused children. *Journal of Abnormal Psychology*, 112(3), 323–338.
- Raviv, A., Erel, O., Fox, N. A., Leavitt, L. A., Raviv, A., Dar, I., Shahinfar, A., & Greenbaum, C. W. (2001). Individual measurement of exposure to everyday violence among elementary schoolchildren across various settings. *Journal of Community Psychology*, 29(2), 117–140.
- Raviv, A., Raviv, A., Shimoni, H., Fox, N. A., & Leavitt, L. A. (1999). Children's self-report of exposure to violence and its relation to emotional distress. *Journal of Applied Developmental Psychology*, 20(2), 337–353.
- Rich-Edwards, J. W., Mason, S., Rexrode, K., Spiegelman, D., Hibert, E., Kawachi, I., Jun, H. J., & Wright, R. J. (2012). Physical and sexual abuse in childhood as predictors of early-onset cardiovascular events in women. *Circulation*, 126(8), 920–927. <https://doi.org/10.1161/CIRCULATION.AHA.111.076877>
- Riedl, D., Lampe, A., Exenberger, S., Nolte, T., Trawöger, I., & Beck, T. (2020). Prevalence of adverse childhood experiences (ACEs) and associated physical and mental health problems amongst hospital patients: Results from a cross-sectional study. *General Hospital Psychiatry*, 64, 80–86. <https://doi.org/10.1016/j.genhosppsych.2020.03.005>
- Rolon-Arroyo, B., Oosterhoff, B., Layne, C. M., Steinberg, A. M., Pynoos, R. S., & Kaplow, J. B. (2020). The UCLA PTSD reaction index for DSM-5 brief form: A screening tool for trauma-exposed youths. *Journal of the American Academy of Child and Adolescent Psychiatry*, 59(3), 434–443. <https://doi.org/10.1016/j.jaac.2019.06.015>
- Rosen, M. L., Hagen, M. P., Lurie, L. A., Miles, Z. E., Sheridan, M. A., Meltzoff, A. N., & McLaughlin, K. A. (2020). Cognitive stimulation as a mechanism linking socioeconomic status with executive function: A longitudinal investigation. *Child Development*, 91(4), e762–e779. <https://doi.org/10.1111/cdev.13315>
- Rosen, M. L., Sheridan, M. A., Sambrook, K. A., Meltzoff, A. N., & McLaughlin, K. A. (2018). Socioeconomic disparities in academic achievement: A multi-modal investigation of neural mechanisms in children and adolescents. *NeuroImage*, 173, 298–310. <https://doi.org/10.1016/j.neuroimage.2018.02.043>
- Sacchi, C., Vieno, A., & Simonelli, A. (2018). Italian validation of the Childhood Trauma Questionnaire—Short form on a college group. *Psychological Trauma: Theory, Research, Practice, and Policy*, 10(5), 563–571. <https://doi.org/10.1037/tra0000333>
- Salhi, C., Beatriz, E., McBain, R., McCoy, D., Sheridan, M., & Fink, G. (2021). Physical discipline, deprivation, and differential risk of developmental delay across 17 countries. *Journal of the American Academy of Child & Adolescent Psychiatry*, 60(2), 296–306. <https://doi.org/10.1016/j.jaac.2020.02.016>
- Shackman, J. E., Shackman, A. J., & Pollak, S. D. (2007). Physical abuse amplifies attention to threat and increases anxiety in children. *Emotion*, 7(4), 838–852. <https://doi.org/10.1037/1528-3542.7.4.838>
- Shaffer, A., Huston, L., & Egeland, B. (2008). Identification of child maltreatment using prospective and self-report methodologies: A comparison of maltreatment incidence and relation to later psychopathology. *Child Abuse & Neglect*, 32(7), 682–692. <https://doi.org/10.1016/j.chiabu.2007.09.010>
- Shahinfar, A., Fox, N. A., & Leavitt, L. A. (2000). Preschool children's exposure to violence: Relation of behavior problems to parent and child reports. *American Journal of Orthopsychiatry*, 70(1), 115–125. <https://doi.org/10.1037/h0087690>
- Sheridan, M., Drury, S., McLaughlin, K., & Almas, A. (2010). Early institutionalization: Neurobiological consequences and genetic modifiers.

- Neuropsychology Review*, 20(4), 414–429. <https://doi.org/10.1007/s11065-010-9152-8>
- Sheridan, M. A., & McLaughlin, K. (2014). Dimensions of early experience and neural development: Deprivation and threat. *Trends in Cognitive Sciences*, 18(11), 580–585.
- Sheridan, M. A., & McLaughlin, K. A. (2016a). Neurobiological models of the impact of adversity on education. *Current Opinion in Behavioral Sciences*, 10, 108–113. <https://doi.org/10.1016/j.cobeha.2016.05.013>
- Sheridan, M. A., & McLaughlin, K. A. (2016b). Neurobiological models of the impact of adversity on education. *Current Opinion in Behavioral Sciences*, 10, 108–113. <https://doi.org/10.1016/j.cobeha.2016.05.013>
- Sheridan, M. A., McLaughlin, K. A., Winter, W., Fox, N., Zeanah, C., & Nelson, C. A. (2018). Early deprivation disruption of associative learning is a developmental pathway to depression and social problems. *Nature Communications*, 9(1), 2216. <https://doi.org/10.1038/s41467-018-04381-8>
- Sheridan, M. A., Peverill, M., Finn, A. S., & McLaughlin, K. A. (2017). Dimensions of childhood adversity have distinct associations with neural systems underlying executive functioning. *Development and Psychopathology*, 29(5), 1777–1794.
- Sheridan, M. A., Shi, F., Miller, A. B., Salhi, C., & McLaughlin, K. A. (2020). Network structure reveals clusters of associations between childhood adversities and development outcomes. *Developmental Science*, 23(5), e12934. <https://doi.org/10.1111/desc.12934>
- Sierau, S., White, L. O., Klein, A. M., Manly, J. T., von Klitzing, K., & Herzberg, P. Y. (2018). Assessing psychological and physical abuse from children's perspective: Factor structure and psychometric properties of the picture-based, modularized child-report version of the Parent-Child Conflict Tactics Scale – Revised (CTSPC-R). *PLoS ONE*, 13(10), <https://doi.org/10.1371/journal.pone.0205401>
- Skar, A.-M. S., Jensen, T. K., & Harpviken, A. N. (2021). Who reports what? A comparison of child and caregiver reports of child trauma exposure and associations to post-traumatic stress symptoms and functional impairment in child and adolescent mental health clinics. *Research on Child and Adolescent Psychopathology*, 49(7), 919–934. <https://doi.org/10.1007/s10802-021-00788-y>
- Smith, K. E., & Pollak, S. D. (2020). Rethinking concepts and categories for understanding the neurodevelopmental effects of childhood adversity. *Perspectives on Psychological Science*, 1745691620920725. <https://doi.org/10.1177/1745691620920725>
- Steinberg, A. M., Brymer, M. J., Decker, K. B., & Pynoos, R. S. (2004). The University of California at Los Angeles post-traumatic stress disorder reaction index. *Current Psychiatry Reports*, 6(2), 96–100.
- Straus, M., & Douglas, E. (2004). A short form of the revised conflict tactics scales, and typologies for severity and mutuality. *Violence and Victims*, 19, 507–520. <https://doi.org/10.1891/088667004780927800>
- Straus, M. A., Kinard, E. M., & Williams, L. M. (1995). *The multidimensional neglectful behavior scale, Form A: Adolescent and adult-recall version*. Durham, NH: University of New Hampshire: Family Research Laboratory. <http://pubpages.unh.edu/~mas2>
- Straus, M. A., & Mattingly, M. J. (2007). *A short form and severity level types for the Parent-Child Conflict Tactics Scales*. Durham, NH: Family Research Laboratory, University of New Hampshire.
- Straus, M. A., & Hamby, S. L. (1997). *Measuring Physical & Psychological Maltreatment of Children with the Conflict Tactics Scales*. <http://eric.ed.gov/?id=ED410301>
- Straus, M. A., Hamby, S. L., BONEY-McCOY, S. U. E., & Sugarman, D. B. (1996). The Revised Conflict Tactics Scales (CTS2) development and preliminary psychometric data. *Journal of Family Issues*, 17(3), 283–316. <https://doi.org/10.1177/019251396017003001>
- Straus, M. A., Hamby, S. L., Finkelhor, D., Moore, D. W., & Runyan, D. (1998). Identification of child maltreatment with the parent-child conflict tactics scales: Development and psychometric data for a national sample of American parents. *Child Abuse & Neglect*, 22(4), 249–270. [https://doi.org/10.1016/S0145-2134\(97\)00174-9](https://doi.org/10.1016/S0145-2134(97)00174-9)
- Suglaw, B. W., Zaslow, M., Smith, J. R., Brooks-Gunn, J., Coates, D., Blumenthal, C., Moore, K. A., Griffin, T., & Bradley, R. (1995). The early childhood HOME inventory and HOME-short form in differing racial/ethnic groups: Are there differences in underlying structure, internal consistency of subscales, and patterns of prediction? *Journal of Family Issues*, 16(5), 632–663. <https://doi.org/10.1177/019251395016005007>
- Tajima, E. A., Herrenkohl, T. I., Huang, B., & Whitney, S. D. (2004). Measuring child maltreatment: A comparison of prospective parent reports and retrospective adolescent reports. *American Journal of Orthopsychiatry*, 74(4), 424–435. <https://doi.org/10.1037/0002-9432.74.4.424>
- Teicher, M. H., & Parigger, A. (2015). The 'Maltreatment and abuse chronology of exposure' (MACE) scale for the retrospective assessment of abuse and neglect during development. *PLOS ONE*, 10(2), e0117423. <https://doi.org/10.1371/journal.pone.0117423>
- Thombs, B. D., Bernstein, D. P., Lobbstaal, J., & Arntz, A. (2009). A validation study of the Dutch Childhood Trauma Questionnaire-Short Form: Factor structure, reliability, and known-groups validity. *Child Abuse & Neglect*, 33(8), 518–523. <https://doi.org/10.1016/j.chiabu.2009.03.001>
- Totsika, V., & Sylva, K. (2004). The home observation for measurement of the environment revisited. *Child and Adolescent Mental Health*, 9(1), 25–35. <https://doi.org/10.1046/j.1475-357X.2003.00073.x>
- Tottenham, N. (2013). The importance of early experiences for neuro-affective development. *Current Topics in Behavioral Neurosciences*. https://doi.org/10.1007/7854_2013_254
- Vega, E. M., & O'Leary, K. D. (2007). Test-retest Reliability of the Revised Conflict Tactics Scales (CTS2). *Journal of Family Violence*, 22(8), 703–708. <https://doi.org/10.1007/s10896-007-9118-7>
- Weissman, D. G., Bitran, D., Miller, A. B., Schaefer, J. D., Sheridan, M. A., & McLaughlin, K. A. (2019). Difficulties with emotion regulation as a transdiagnostic mechanism linking child maltreatment with the emergence of psychopathology. *Development and Psychopathology*, 31(3), 899–915. <https://doi.org/10.1017/S0954579419000348>
- Widom, C., Raphael, K., & DuMont, K. (2004). The case for prospective longitudinal studies in child maltreatment research: Commentary on Dube, Williamson, Thompson, Felitti, and Anda (2004). *Child Abuse & Neglect*, 28(7), 715–722. <https://doi.org/10.1016/j.chiabu.2004.03.009>
- Wingenfeld, K., Spitzer, C., Mensebach, C., Grabe, H. J., Hill, A., Gast, U., Schlosser, N., Höpp, H., Beblo, T., & Driessen, M. (2010). [The German version of the Childhood Trauma Questionnaire (CTQ): Preliminary psychometric properties]. *Psychotherapie, Psychosomatik, medizinische Psychologie*, 60(11), 442–450. <https://doi.org/10.1055/s-0030-1247564>
- Young, E. S., Frankenhuis, W. E., & Ellis, B. J. (2020). Theory and measurement of environmental unpredictability. *Evolution and Human Behavior*, 41(6), 550–556. <https://doi.org/10.1016/j.evolhumbehav.2020.08.006>
- Zhao, X., Zhang, Y., Li, L., & Zhou, Y. (2005). Evaluation on reliability and validity of Chinese version of childhood trauma questionnaire. *Chinese Journal of Tissue Engineering Research*, 9(16), 209–211.