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Deprivation and threat, emotion dysregulation, and psychopathology: Concurrent and longitudinal associations

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Abstract

Maltreatment increases risk for psychopathology in childhood and adulthood, thus identifying mechanisms that influence these associations is necessary for future prevention and intervention. Emotion dysregulation resulting from maltreatment is one potentially powerful mechanism explaining risk for psychopathology. This study tests a conceptual model that distinguishes *deprivation* and *threat* as distinct forms of exposure with different pathways to psychopathology. Here we operationalize threat as exposure to physical and/or sexual abuse and deprivation as exposure to neglect. We test the hypothesis that threat and deprivation differentially predict use of avoidant strategies and total regulation. Data were drawn from the Longitudinal Studies on Child Abuse and Neglect (LONGSCAN study; *N* = 866), which followed high-risk children from age 4 to 18. At age 6, children and their parents reported on adversity exposure. Case records documented exposure to abuse and neglect. At 18, adolescents reported on regulation strategies and psychopathology. Regression analyses indicated that greater exposure to threat, but not deprivation, predicted greater use of avoidant strategies in adolescence. Moreover, avoidance partially mediated the longitudinal association between exposure to threat in early childhood and symptoms of internalizing psychopathology in adolescence. Results suggest that abuse and neglect differentially predict regulation strategy use and that regulation strategy use predicts psychopathology.

Keywords: abuse, Dimensional Model of Adversity and Psychopathology, emotion dysregulation, maltreatment, neglect, psychopathology

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Exposure to child maltreatment greatly increases the risk for psychopathology in childhood and adulthood (Kim & Cicchetti, 2010; McLaughlin et al., 2010). Specifically, as many as 80% of young adults exposed to maltreatment in childhood meet diagnostic criteria for at least one psychiatric disorder at age 21 (Silverman, Reinherz, & Giaconia, 1996). The magnitude and longevity of these consequences have led researchers to direct considerable attention toward identifying the mechanisms that play pivotal roles in the effects. Of particular interest to clinicians are malleable mechanisms that could serve as targets for interventions. One such mechanism that is malleable (Chambers, Gullone, & Allen, 2009; Collins, Woolfson, & Durkin, 2014) and linked with both psychopathology (Cline et al., 2015; D'Avanzato, Joormann, Siemer, & Gotlib, 2013; Silk, Steinberg, & Morris, 2003; Sontag & Graber, 2010) and maltreatment exposure (Cicchetti & Rogosch, 2009; Kim & Cicchetti, 2010; Maughan & Cicchetti, 2002; Milojevich, Levine, Cathcart, & Quas, 2018; Perlman, Dawson, Dardis, Egan, & Anderson, 2016; Romens & Pollak, 2012; Shields & Cicchetti, 1998) is emotion regulation. Traditionally, emotion regulation has been defined as the "internal and external processes involved in initiating, maintaining, and modulating the occurrence, intensity, and expression of emotions" (Thompson, 1994, p. 27). Adults and children implement specific regulation strategies to alter or modulate their emotional state that can be measured through observation or self-report.

Of note, in the present report we focus on emotion regulation strategies and their links to child maltreatment and psychopathology; however, where relevant, we also refer to findings from the coping literature. Coping is defined as the cognitive and behavioral efforts to manage specific emotional demands that are appraised as taxing or exceeding the resources of that person (e.g., Lazarus & Folkman, 1984). As such, coping efforts by an individual can be considered to fall under the broader definition of emotion regulation (Garnefski, Kraaij, & Spinhoven, 2001), and measures of coping, such as the one utilized in the present study, have been included in investigations of emotion regulation (Aldao & Nolen-Hoeksema, 2012; Aldao, Nolen-Hoeksema, & Schweizer, 2010). Moreover, specific regulation or coping strategies are generally utilized with the goal of adaptive behavior; however, when strategies are employed in a manner that interferes with adaptive goal-oriented behavior, it is considered emotion *dys*regulation—a defining risk factor for psychopathology (Beauchaine, 2015; Cole, Hall, & Hajal, 2017).

To date, most studies on emotion regulation in the face of child maltreatment have combined children into a single maltreatment group and compared their functioning to nonmaltreated controls. As such, it is unclear how exposure to the

different forms of maltreatment (e.g., physical abuse vs. neglect) differentially predict regulation tendencies. Recently, Sheridan and McLaughlin (2014) have proposed an alternative, novel conceptual framework, termed the Dimensional Model of Adversity and Psychopathology (DMAP), for studying the effects of early adversity exposure. The central distinction they make is between experiences of *deprivation* and *threat*. Specifically, they suggest that, although exposure to deprivation (operationalized here as exposure to neglect) and threat (operationalized here as exposure to physical and/or sexual abuse) likely co-occur (McLaughlin et al., 2012), these dimensions can be measured separately and have unique effects on developmental outcomes (Sheridan, Peverill, Finn, & McLaughlin, 2017). Within DMAP, deprivation refers to the absence of species- or age-expectant cognitive and social inputs (Sheridan & McLaughlin, 2014, 2016). Exposure to deprivation is conceptualized as reductions in species-expected social and cognitive inputs, generally through a lack of interaction, or a lack of scaffolding by primary caregivers. This lack of early learning experiences leads to reduced abilities to perform complex cognitive functions, including social problem solving in the future. Exposure to threat, in contrast, involves the presence of atypical learning experiences around traumatic violence. These early learning experiences lead to changes in neural circuits that underlie emotion reactivity and regulation, resulting in enhanced reactivity to negative affective stimuli. Evidence suggests that, in models where both exposures are simultaneously introduced, exposure to threat is selectively associated with increased emotion reactivity, deficits in automatic emotion regulation processes, and disrupted fear learning, while exposure to deprivation is selectively linked to poor cognitive control, working memory, and language ability (Lambert, King, Monahan, & McLaughlin, 2017; McLaughlin et al., 2016; Miller et al., 2018; Sheridan et al., 2017). In the present study we extend the deprivation and threat predictions to examine regulation strategies as potential emotion-focused mediators linking exposure to abuse and neglect early in life to symptoms of psychopathology in adolescence. As such, the present study provides insight into the nature of maltreated children's emotion dysregulation by pinpointing the types of regulation strategies that differ by exposure to deprivation and threat and indicating whether these strategies confer risk for psychopathology in adolescence.

The present study contributes to what is known about the development of emotion dysregulation and its links to psychopathology in three ways. First, the roles of threat and deprivation in early childhood as unique predictors of adolescents' subsequent use of regulation strategies are documented within a large, diverse sample of high-risk youth. Specifically, the study includes a sample of children who had been maltreated or were at risk of maltreatment. These children were recruited when they were 4 years old or younger and followed longitudinally into adolescence. As such, the present study allows for an examination of how exposure to maltreatment experienced prior to age 6 predicts emotion dysregulation in adolescence. Second, in-depth assessments of the parenting and home environment obtained via multiple sources (child report, parent report, and official case files) are integrated to more comprehensively characterize early abuse and neglect exposure. Third, the present study expands on the mediational pathways initially proposed and tested in DMAP (Busso, McLaughlin, & Sheridan, 2017; Miller et al., 2018; Sheridan & McLaughlin, 2014) by testing specific regulation strategies as potential mediators linking exposure to maltreatment to subsequent psychopathology.

Emotion Dysregulation and Psychopathology

Across both the emotion regulation and coping literatures, specific strategies have been consistently linked to a range of mental health outcomes (Aldao et al., 2010; Compas et al., 2017; Gross, 2014). For example, strategies such as problem solving and seeking social support are predictive of improved functioning (i.e., fewer problems) across childhood and adolescence (Aldao et al., 2010; Compas et al., 2017; Downey, Johnston, Hansen, Birney, & Stough, 2010; Machmutow, Perren, Sticca, & Alsaker, 2012). In contrast, disengagement strategies, particularly avoidance, have been repeatedly and strongly associated with poor mental health outcomes and increased risk for psychopathology (Aldao et al., 2010; Aldao, Jazaieri, Goldin, & Gross, 2014; Aldao & Nolen-Hoeksema, 2010; Cisler, Olatunji, Feldner, & Forsyth, 2010; Compas et al., 2017; Gross, 2014; Schäfer, Naumann, Holmes, Tuschen-Caffier, & Samson, 2017; Silk et al., 2003; Sontag & Graber, 2010).

In children, for example, more frequent use of avoidance has been linked to greater psychopathology (Coyne & Thompson, 2011; Horwitz, Hill, & King, 2011; Silk et al., 2003). This association seems to be particularly strong later in development, specifically during adolescence. Avoidance, as well as other disengagement strategies, in adolescents is associated with greater substance use (McConnell, Memetovic, & Richardson, 2014), more internalizing and externalizing symptoms (Compas et al., 2017; Cisler et al., 2010; Schäfer et al., 2017), and elevated aggression (Sontag & Graber, 2010). Even more striking, in a recent meta-analysis (Compas et al., 2017), only avoidance and other forms of disengagement predicted psychopathology over time. Overall, these findings suggest that avoidance may be a particularly robust predictor of psychopathology, especially with regard to internalizing symptoms.

Maltreatment and Adolescent Emotion Dysregulation

A number of studies have documented evidence that maltreatment during childhood is linked to emotion dysregulation (Flannery, Singer, Williams, & Castro, 1998; Flett, Druckman, Hewitt, & Wekerle, 2012; Maughan & Cicchetti, 2002; Milojevich et al., 2018; O'Mahen, Karl, Moberly, & Fedock, 2015; Perlman et al., 2016; Romens & Pollak, 2012; Shields & Cicchetti, 1998; Shields, Ryan, & Cicchetti, 2001; Thabet, Tischler, & Vostanis, 2004), which in turn increases risk for psychopathology (Burns, Jackson, & Harding, 2010; Kim & Cicchetti, 2010; Kim-Spoon, Cicchetti, & Rogosch, 2013; Messman-Moore & Bhuptani, 2017; Peh et al., 2017). Some studies indicate that maltreated adolescents tend to utilize disengagement strategies such as avoidance or escape more so than nonmaltreated youth (Arslan, 2017; Milojevich et al., 2018). Other studies have found that maltreated individuals tend to have more global deficits in regulation and coping (Filipas & Ullman, 2006), while still others indicate that maltreatment is related to more emotion-focused (e.g., self-blame) regulation (Hager & Runtz, 2012). Of particular importance, as mentioned, these studies tend to combine individuals into a single maltreatment group and compare their functioning to that of nonmaltreated controls. As such, it is unclear how exposure to the different forms of maltreatment (e.g., physical abuse vs. neglect) differentially predict emotion dysregulation. However, in a community sample of pregnant women, exposure to emotional abuse versus neglect differentially predicted women's regulation strategy use (O'Mahen et al., 2015). Specifically, emotional abuse was associated

with rumination (a form of cognitive avoidance), while emotional neglect predicted the use of behavioral avoidance. Both strategies were associated with greater depression. Moreover, findings with children exposed to other forms of threat (e.g., domestic violence and community violence) indicate that these children exhibit emotion dysregulation, often in the form of greater use of avoidant strategies (Holt, Buckley, & Whelan, 2008; Rosario, Salzinger, Feldman, & Ng-Mak, 2003; Schwartz & Proctor, 2000; Street, Gibson, & Holohan, 2005). This work suggests that exposure to early and severe forms of threat may have long-term consequences on adolescents' regulation skills, particularly their use of avoidant strategies (e.g., Milojevich et al., 2018).

While neglect is commonly included in the above described studies of maltreatment, findings on the links between exposure to neglect alone, or other forms of deprivation, and emotion dysregulation are considerably less common. One study that we are aware of specifically tested the association between neglect (outside of other forms of maltreatment) and children's emotion regulation and understanding. This study found that, compared to nonneglected peers, neglected children tend to inhibit the expression of negative emotions (Shipman, Edwards, Brown, Swisher, & Jennings, 2005).

Although findings differentiating between the roles of abuse and neglect in predicting regulation strategy are rare, there is evidence to suggest that these forms of maltreatment impact emotional functioning differently (e.g., Pollak, Cicchetti, Hornoung, & Reed, 2000; Warmingham, Handley, Rogosch, Manly, & Cicchetti, 2018). For example, physically abused children tend to recognize and react more quickly to emotional expressions of anger, while neglected children demonstrate more global deficits in emotion recognition (Pollak et al., 2000). These differential impacts support the possibility that abuse and neglect will be differentially associated with regulation strategies as well.

Exposure to Threat, Emotion Dysregulation, and Psychopathology

Within DMAP, several mediational pathways have been explored to explain the consistent link between early adversity exposure and subsequent psychopathology. DMAP proposes that experiences of deprivation will result in deficits in cognitive control, at least in part due to synaptic pruning in the prefrontal cortex. Neglect is one form of deprivation, which is characterized by a reduction in species-expected early inputs, such as cognitive and social stimulation. Hypothetically, this reduction in these inputs in early life may lead to accelerated pruning of synapses in cortical regions implicated in cognitive control similar to the way in which elimination of visual input in early life in rodents and humans leads to reductions in synapses in primary visual cortex measurable as cortical thinning (Leporé et al., 2010; O'Kusky, 1985). Children exposed to extreme deprivation, such as institutionalization, demonstrate global deficits in executive functioning leading to increases in psychopathology (Bos, Fox, Zeanah, & Nelson, 2009; Tibu et al., 2016). Children exposed to less extreme forms of deprivation, such as reductions in cognitive and social stimulation related to poverty, also demonstrate reductions in executive function, complex learning, and language ability leading to increases in psychopathology (Miller et al., 2018; Rosen, Sheridan, Sambrook, Meltzoff, & McLaughlin, 2018; Sarsour et al., 2011; Sheridan, Sarsour, Jutte, D'Esposito, & Boyce, 2012).

In contrast to the deprivation pathway, exposure to threat in early childhood creates long-term changes in neural circuits that underlie reactivity to, regulation of, and associative learning about threatening stimuli because children are exposed to an excess of learning opportunities about threat. Behaviorally, these changes result in heightened attention to threat-related cues, generalization of learned fear to previously neutral stimuli, and elevated emotional reactivity to a wide range of emotional cues, which are predictive of greater internalizing and externalizing symptomatology (Busso, McLaughlin, Brueck, et al., 2017; Lambert et al., 2017; McLaughlin, Peverill, Gold, Alves, & Sheridan, 2015; McLaughlin et al., 2016; Miller et al., 2018).

The present study serves as an expansion by investigating the mediational role of emotion dysregulation postadversity exposure. Given the heightened emotional responses to threatening stimuli and the overall reduction in control experienced in the case of abuse, children exposed to threat may learn to disengage or avoid emotionally negative situations, a potentially adaptive response in high-threat contexts, as a means of protecting themselves from further harm (Pollak, Messner, Kistler, & Cohn, 2009). However, prolonged avoidance is associated with increases in intrusive thoughts, greater emotional distress, and overall increases in psychopathology symptoms (Aldao et al., 2010, 2014; Aldao & Nolen-Hoeksema, 2010; Cisler et al., 2010; Compas et al., 2017; Gross, 2014; Schäfer et al., 2017; Seiffge-Krenke & Klessinger, 2000; Silk et al., 2003; Sontag & Graber, 2010). In contrast, children exposed to deprivation, as in the case of neglect, may not witness normative emotional displays by their parents (Shipman et al., 2005) and, as such, may fail to learn how to identify and differentiate among emotions and thus appropriate strategies for regulating. These children may, therefore, demonstrate more general emotion dysregulation rather than specific differences in strategy use. The goal of the current study is to test these possibilities. Specifically, we first hypothesized that greater levels of threat (i.e., abuse) would be selectively associated with an increased use of avoidant strategies, while deprivation (i.e., neglect) would selectively predict poorer total regulation. Second, we hypothesized that emotion dysregulation, such as greater avoidance, would mediate the association between maltreatment exposure and psychopathology, particularly internalizing symptomatology (Aldao et al., 2010, 2014; Aldao & Nolen-Hoeksema, 2010; Compas et al., 2017; Connor-Smith & Compas, 2004).

Method

A detailed description of the methods used in the Longitudinal Studies on Child Abuse and Neglect (LONGSCAN) has been presented elsewhere (Runyan et al., 1998). With the exceptions of elements unique to the current analyses, only a brief description of the sample and methods is given.

Sample, design, and procedures

LONGSCAN is a consortium of studies operating under common protocols, located at five sites in different regions of the United States: South, East, Midwest, Northwest, and Southwest. The current analysis is based on pooled data from three of these studies (East, Northwest, and Southwest). Data from the South and Midwest were not included as these sites did not administer the regulation measure at age 18. At each of the included sites, a sample of children who had been maltreated or were at risk of maltreatment was recruited when children were 4 years old or younger. The sampling frame used at each site is described in

Table 1. Description of the sampling at each LONGSCAN site

Site	N (% of current sample)	Sampling frame
Eastern	282 (32.6%)	High risk (failure to thrive children, or mothers at high risk for HIV infection, or low-income families)
Southwest	330 (38.1%)	Maltreated children who had been placed in foster care
Northwest	254 (29.3%)	CPS-identified maltreated children

Note: CPS, Child Protective Services.

Table 1. Assessments of children and caregivers were conducted at ages 4, 6, 8, 12, 14, 16, and 18. Brief questionnaire packets were mailed to children's teachers to assess functioning in other domains. The analyses reported here focus on data collected at ages 4, 6, 8, 16, and 18. In the present study, for ages 4 and 6, all 866 participants were interviewed; 727 of the participants (83.9%) were reassessed at age 8; 516 (59.6%) at age 16; and 601 (69.3%) at age 18.

With the approval of each site's institutional review board, a protocol of common measures and procedures was implemented across sites. Informed consent was obtained from caregivers. Children and caregivers participated separately in interviews administered by trained interviewers that included measures of demographics, parental and family functioning, life events and other contextual variables, and child functioning. Families were compensated financially for their participation. Overall, the total sample size for the current study was 866. Table 2 presents descriptive data on the sample, the number of cases that had valid data for each variable, and percentage missing. The sample was almost equally split between boys and girls. A little more than half of the children were African American and about a fourth were White. Roughly three-fourths of the sample had annual family incomes less than US $25,000. Thus, children in the study were more likely to be poor and less likely to be White than children in the general population.

Measures

Adolescent regulation

The 54-item Adolescent Coping Orientation for Problem Experiences (ACOPE; Patterson & McCubbin, 1987) was administered at the age 18 visit to assess adolescents' self-reported coping strategies. Using a 5-point Likert scale (1 = *never*, 5 = *most of the time*), adolescents were instructed to record how often they utilized each behavior in answer to the question, "When you face difficulties or feel tense, how often do you … ." Responses were averaged to create separate mean scores for 12 strategies of regulation: ventilating feelings, seeking diversions, developing self-reliance and optimism, developing social support, solving family problems, avoiding problems, seeking spiritual support, investing in close friends, seeking professional support, engaging in demanding activity, being humorous, and relaxing. Higher scores indicate the use of more positive regulation strategies, except for avoidance in which case higher scores indicate poorer regulation. Three of the scales (ventilating feelings, seeking professional support, and relaxing) had poor reliability in the current sample (αs < 0.50) and were therefore excluded from the analyses.

The remaining scores were further summed (avoidance excluded) to create a total regulation score (individual strategy scores were significantly correlated; $rs > .20$, $ps < .001$). The avoidance subscale was excluded from the total score given our interest in examining avoidance, and its links to maltreatment and psychopathology, separately. The ACOPE has high internal consistency and test–retest reliability (McCubbin, Thompson, & McCubbin, 2001; $\alpha = 0.81$ and 0.89, for avoidance and total regulation respectively, in current sample).

Threat

Early exposure to threat was assessed via four separate measures. First, investigators at the three sites reviewed Child Protective Services (CPS) data to determine the presence and nature of allegations of physical and sexual abuse that occurred before the target child was age 6 years. Coders at each site were trained to use the Modified Maltreatment Classification System (MMCS; a LONGSCAN modified version of Barnett, Manly, & Cicchetti, 1993) by experienced coders until they reached 90% agreement with the gold standard. Second, to further ensure reliable coding, coders at all sites coded a subsample ($n = 109$) of the CPS narratives that represented cases from each site. Kappas for MMCS codes by LONGSCAN coders were high (ranging from .73 to .87; English & LONGSCAN Investigators, 1997). Reviews of CPS data were used to determine the presence and nature of allegations of (a) physical abuse and (b) sexual abuse on children in their samples. Children were assigned a dichotomous code, based on whether abuse allegations had occurred, and differentiated by type (physical vs. sexual) using the MMCS.

Third, an expanded version of the child-report Things I Have Seen and Heard scale (Richters & Martinez, 1992) was administered at the age 6 visit to assess exposure to violence and feelings of safety at home, at school, and in the community. Things I Have Seen and Heard has high test–retest reliability and good validity (Richters & Martinez, 1992; $\alpha = 0.74$ in current sample). The LONGSCAN version used in the current study added five items to include violence witnessed in the home. Children were asked to endorse the frequency of each item using a visual Likert-type scale.

Fourth, at the age 6 visit, the caregiver-report Conflict Tactics Scales: Caregiver-to-Child (Straus, 1979) assessed the extent to which caregivers use reasoning and nonviolent discipline, verbal aggression, or physical aggression in response to their child's behavior. Participant responses are summed into three broad categories: nonviolent discipline, psychological aggression, and minor assault. For the current study, minor assault scores were used, with higher scores indicating greater physical threat to the child ($\alpha = 0.85$ in current sample). Finally, we z-transformed and summed the four measures (CPS reports of physical and sexual abuse, Things I've Seen, and Conflict Tactics Scale) to create an overall threat exposure composite, with higher scores indicating greater exposure to threat.

Deprivation

Using the methods described above for threat, reviews of CPS data were utilized to determine the presence and nature of allegations of neglect. For the current analyses, neglect allegations were limited to those that occurred before the target child was age 6 years. The present study used a dichotomous indicator (i.e., 0 = *not alleged*, 1 = *alleged*) of neglect.

Table 2. Descriptive statistics for the sample

Variable name	*N* valid	Proportion or *M* (*SD*)	Percentage missing	Percentage diagnosed
Demographics				
Child sex (% female)	866	50.1%	0%	—
Child ethnicity	865		0.01%	—
African American		50.5%		
White		24.2%		
Other		24.4%		
Caregiver marital status	751		13.3%	—
Single		34.9%		
Married		29.2%		
Formerly married		26.1%		
Family income (% <US $25,000)	731	74.0%	15.6%	—
Family context				
Neglect	866	64.3%	0%	—
Physical abuse	866	32.1%	0%	—
Sexual abuse	866	13.6%	0%	—
Exposure to violence	656	11.00 (8.66)	24.2%	—
CTS physical aggression	735	1.39 (1.17)	15.1%	—
Caregiver psychological distress	727	48.61 (11.17)	16.1%	—
Adolescent functioning				
Cognitive functioning	516	41.06 (7.82)	40.4%	—
Regulation				
Avoidance	576	19.10 (3.33)	33.5%	—
Total regulation	567	110.68 (22.37)	34.5%	—
Psychopathology				
Major depressive disorder	585	4.51 (4.37)	32.4%	2.4%
Generalized anxiety disorder	589	1.95 (2.12)	32.0%	0.9%
Oppositional defiant disorder	580	2.48 (2.72)	33.0%	3.1%
Posttraumatic stress disorder	600	1.11 (2.81)	30.7%	2.0%
Attention-deficit/hyperactivity disorder	578	3.57 (4.11)	33.3%	2.8%

Psychopathology

Adolescent psychopathology was assessed at the age 18 visit via the National Institute of Mental Health Computerized Diagnostic Interview Schedule for Children (Young Adult DISC-IV; Shaffer, Fisher, Lucas, Dulcan, & Schwab-Stone, 2000). The DISC-IV included assessment for diagnostic status as well as for symptoms of each disorder that had occurred over the preceding year. This version of the DISC-IV assesses symptoms and diagnostic status is based on the DSM-IV-TR (Shaffer et al., 2000). The present study included symptom counts for major depressive disorder (MDD), generalized anxiety disorder, oppositional defiant disorder (ODD), posttraumatic stress disorder (PTSD), and attention-deficit/ hyperactivity disorder (ADHD).

Demographics

At the age 4 visit, a caregiver-report measure was developed by LONGSCAN including items that assess sociodemographic variables measured either at one time (i.e., child sex and race) or at each interview (i.e., number of dependents) to reflect changes in the home environment experienced by many of the children. Caregiver reports of family income from the age 4 visit were also included. For the purposes of the present study, income was recoded so that higher scores indicated lower incomes.

Cognitive functioning

The Wide Range Achievement Test (Wilkinson, 1993), administered at age 16, provided an assessment of adolescents' basic academic skills. The present study utilized the standard age-based reading scores; higher scores were reflected of higher achievement.

Caregiver psychological distress

Caregiver psychological distress was assessed at the age 8 visit using the global severity index of the Brief Symptom Inventory (Derogatis & Spencer, 1993), a 53-item scale assessing psychological symptomatology that is valid and strongly related with other indices of psychological distress (Derogatis & Spencer, 1993). The global severity *t* score on the Brief Symptom Inventory was used in all relevant analyses.

Statistical analyses: Overview

Our analyses proceeded in three steps. First, we tested for bivariate associations between adolescents' emotion regulation and childhood exposure to deprivation and threat, sex, race, caregiver psychological distress, income, and cognitive functioning. Second, we tested via multiple regression models whether the relation between child maltreatment and adolescents' emotion regulation held after accounting for relevant demographic (e.g., sex) and other family factor (e.g., income) measures. Third, we estimated mediation models in a structural equation modeling framework to test whether the association between child maltreatment exposure at age 6 and adolescent psychopathology at age 18 was mediated by specific regulation strategies, while controlling for demographic and family factors. The statistical significance of the indirect and total effects in each model were assessed via bootstrapped confidence intervals (95%). All analyses were conducted in Mplus Version 8 (Muthén & Muthén, 1998–2017) using maximum likelihood estimation. In all analyses missing data (see Table 2 for percentages) were handled through full information maximum likelihood procedure (Raykov, 2005), which performs equally well, and often better than multiple imputation techniques, with respect to correcting bias in estimates and recovering known population parameters (Schafer & Graham, 2002).

Results

Descriptive analyses

Correlations among potential predictor variables and adolescent regulation scores are presented in Table 3. Overall, greater threat and deprivation exposure, being male, being non-African American, and greater caregiver psychological distress were associated with greater use of avoidance. Moreover, being African American was associated with better total regulation, while being White or of another race was related to poorer total regulation. Of note, exposure to deprivation and threat were positively correlated ($r = .089$, $p = .025$).

Child maltreatment and adolescent emotion dysregulation

One of the primary goals of the present study was to examine whether specific forms of maltreatment exposure differentially predicted subsequent regulation strategy use in adolescents. In particular, we were interested in whether threat exposure predicted avoidant regulation and deprivation predicted total regulation. As illustrated in Table 4, when controlling for deprivation, demographic, and family factors, avoidant regulation differed significantly by exposure to threat, such that higher threat exposure was associated with more avoidance. In this model, we also observed that boys reported more avoidance than girls. For total regulation, race was a significant predictor, such that adolescents who were White or of another race reported poorer total regulation relative to African Americans, but no significant associations were found between total regulation and deprivation once controlling for threat and other family factors.

Mediational pathways to adolescent psychopathology

We estimated mediation models in a structural equation modeling framework to examine the direct effect of threat and deprivation on adolescent psychopathology and the indirect effect(s) of threat and deprivation on adolescent psychopathology through the use

Table 3. Correlations among main predictor and adolescent regulation scores

	Avoidance	Total regulation
Threat	**.172****	−.066
Deprivation	**.100***	−.072
Sex	**−.132****	.060
African American	**−.104***	**.182****
White	.081	**−.103****
Other race	.053	**−.121****
Caregiver psychological distress	**.097***	−.032
Family income	−.021	.038
Cognitive functioning	.023	−.027

Note: Sex: female = 2, male = 1; *$p < .05$. **$p < .01$.

of regulation strategies. Based on the regression results reported above, we focused the mediational analyses on exposure to threat as the predictor and on avoidance as the mediator. In all models, we continued to account for deprivation, demographic, and family factors. We analyzed separate mediational models predicting a range of internalizing (e.g., depression) and externalizing (e.g., oppositional defiant disorder) symptomatology. Due to the timing of the original data collection, we were unable to estimate a truly longitudinal mediation model. Specifically, our predictor variable (exposure to threat) was measured at Time 1 (age 6), and our mediator and outcome variables (regulation and psychopathology, respectively) were measured at Time 2 (age 18). Cole and Maxwell (2003) refer to this as a half-longitudinal design and warn that this may result in a biased estimate of the effect of the mediator on the outcome. To address this limitation, we estimated alternative models in which adolescent psychopathology mediated the effect between threat and regulation strategies.

First, we tested whether the association between exposure to threat and adolescent MDD was explained by avoidance. Four main paths were estimated: path a, the association between threat (the predictor) and avoidance (the mediator); path b, the association between avoidance and MDD (the outcome); path c, the total effect of threat (the predictor) on MDD (the outcome), not adjusting for avoidance (the mediator); and path c', the association between threat and MDD, adjusted for avoidance. We also tested the statistical significance of the indirect effect of threat on MDD via bootstrapped confidence intervals. The indirect effect was considered statistically significant if the 95% confidence interval (CI) for a parameter estimate did not include a value of zero. We included deprivation and child sex as covariates in the model.

Results for MDD are shown in Figure 1. All paths in the model, with the exception of the total effect (path c), were statistically significant. The direct effect of exposure to threat on adolescent MDD (path c) was reduced once the mediational pathway was estimated (the effect size reduces by .03). The indirect effect of exposure to threat on adolescent MDD (path a*path b) was significant, 95% CI [.01, .06]. For the alternative model, the MDD and avoidance variables were interchanged so that MDD served as a mediator in the association between exposure to threat and avoidance. All paths in the model remained significant, including the indirect effect, $b = .03$, 95% CI = [.01 − .05]; however, the direct effect of exposure to threat on adolescent MDD (path c') remained statistically significant when the mediational pathway was estimated ($p = .008$).

Table 4. Regression results for adolescent regulation

	Model			
	B	SE	t	p
Avoidance				
Center	−.104	.058	−1.796	.072
Sex	−.133	.040	−3.302	**.001****
White	.044	.050	0.895	.371
Other race	.013	.052	0.249	.803
Caregiver psych. distress	.070	.044	1.600	.110
Income	−.002	.049	−0.032	.975
Deprivation	.037	.048	0.769	.442
Threat	.087	.042	2.084	**.037***
Total regulation				
Center	.003	.059	0.044	.965
Sex	.059	.041	1.431	.152
White	−.150	.050	−3.022	**.001****
Other race	−.170	.052	−3.290	**.001****
Caregiver psych. distress	−.017	.044	−0.376	.707
Income	−.017	.048	−0.344	.731
Deprivation	−.023	.049	−0.458	.647
Threat	.004	.042	0.091	.928

Note: Sex: *female* = 2, *male* = 1; White (*Yes* = 1; *No* = 0); Other race (*Yes* = 1; *No* = 0); African American served as reference group. *p < .05. **p < .01.
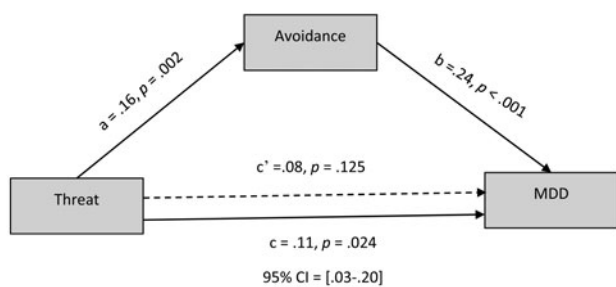
Figure 1. Mediational model for major depressive disorder. The model controls for deprivation and child sex. Dashed line denotes an effect accounting for the mediator.

Figure 2. Mediational model for posttraumatic stress disorder. The model controls for deprivation and child sex. Dashed line denotes an effect accounting for the mediator.

Second, for PTSD, we again estimated four paths: path a, the association between threat (the predictor) and avoidance (the mediator); path b, the association between avoidance and PTSD (the outcome); path c, the total effect of threat (the predictor) on PTSD (the outcome), not adjusting for avoidance; and path c', the association between threat and PTSD, adjusted for avoidance. Deprivation and child sex were once again included in the model. Results are shown in Figure 2. All paths in the model were statistically significant. The total effect of exposure to threat on adolescent PTSD (path c) was reduced and became nonsignificant once the mediational pathway was estimated (the effect size reduces by .02). The indirect effect of exposure to threat on adolescent PTSD (path a*path b) was significant, 95% CI [.03, .23]. For the alternative model in which avoidance and PTSD were interchange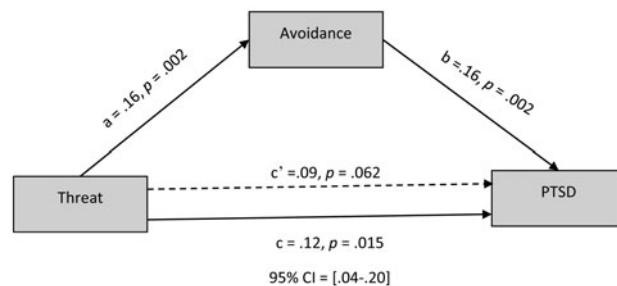d, all paths remained significant, including the indirect effect of threat on avoidance through PTSD, b = .02, 95% CI = [.003 – .03]; however, the direct effect of exposure to threat on adolescent PTSD (path c') remained statistically significant when the mediational pathway was estimated (p = .006).

Third and finally, for generalized anxiety disorder, oppositional defiant disorder, and ADHD all paths were once again estimated as described above. The direct effects of exposure to threat on adolescent generalized anxiety disorder, oppositional defiant disorder, and ADHD were not statistically significant (ps = .068–.259); therefore, avoidance was not considered as a possible mediator.

Discussion

Children exposed to maltreatment are at increased risk for psychopathology both during childhood and across the life span. Findings from the present study add to what is known about exposure to maltreatment and adolescents' subsequent development of psychopathology in two ways. First, results show exposure to threat (in the form of physical and/or sexual abuse), but not deprivation (neglect), predicts the use of avoidant regulation, with adolescents who were exposed to higher levels of threat utilizing avoidant strategies more so than adolescents with lower rates of exposure. Second, mediational analyses suggest that avoidant regulation may help explain why differences in psychopathology, particularly internalizing symptomatology, are observed between adolescents exposed to higher versus lower threat.

Despite evidence that child maltreatment predicts deficits or alterations in emotional functioning (Cicchetti & Rogosch, 2009; Flett et al., 2012; Kim & Cicchetti, 2010; Maughan & Cicchetti, 2002; Milojevich et al., 2018; Perlman et al., 2016; Romens & Pollak, 2012; Shields & Cicchetti, 1998), few studies have examined the specific strategies that adolescents report using to regulate their negative emotions or how the use of these strategies may vary by exposure to different forms of maltreatment. The present study tested a model distinguishing between dimensions of threat and deprivation (McLaughlin et al., 2016; Sheridan & McLaughlin, 2014) in a longitudinal study spanning 18 years of development. Overall, findings indicated that, as expected, exposure to threat early in life predicted greater use of avoidance during adolescence. Early threat exposure, such as physical abuse, places children in harmful or potentially harmful situations often beyond the control of the child. Moreover, abusive parents often fail to teach their children a range of appropriate and adaptive regulation and coping strategies (Shipman et al., 2007). As such, one explanation for the present study's findings is that threat-exposed children may not have

developed the regulation skills to elicit change in emotionally taxing situations and thereby respond by avoiding their emotions or the emotion-causing situation. Alternatively, threat-exposed children tend to have more extreme emotional reactivity to negative events compared to nonexposed children (McLaughlin, Sheridan, Alves, & Mendes, 2014), which may make it more difficult for them to regulate or cope with intense negative feelings than for non-threat exposed children. As a result, threat-exposed children may be overwhelmed in emotion-eliciting situations, leading them to avoid such situations and emotions. Future work is needed to test these possible explanations. Future work on this subject is important given that the present study highlights the role of avoidance in the development of psychopathology longitudinally in threat-exposed youth.

Furthermore, tests of mediation in the present study suggested that the reliance on avoidant regulation partially explained the association between early threat exposure and subsequent symptoms of psychopathology, particularly symptoms of depression and PTSD. As expected, the effect of threat and avoidant regulation was found for internalizing, but not externalizing, disorders. Previous findings have suggested that avoidance is more robustly associated with internalizing symptomatology, with avoidance longitudinally predicting increases in internalizing, but not externalizing, symptomatology (Compas et al., 2017). However, Compas et al. combined disorders into broad "internalizing" and "externalizing" categories; therefore, the effect of avoidance on specific disorders could not be ascertained. In the present study, we elected to analyze each disorder individually, thereby providing novel insight into the ways in which threat exposure leads to specific forms of internalizing psychopathology in adolescents. Of note, given the half-longitudinal nature of our data (i.e., mediator and outcome variables were both measured at age 18), we estimated alternative models in which adolescent psychopathology mediated the effect between threat and regulation strategies. These models were significant, however, the direct effect of exposure to threat on adolescent psychopathology (path c) remained statistically significant when the mediational pathways were estimated. These results suggest that symptoms of psychopathology partially mediate the relation between threat and avoidance. We focused on regulation as the mediator given previous longitudinal findings indicating the importance of emotion regulation in predicting psychopathology (Alink, Cicchetti, Kim, & Rogosch, 2009; Campos et al., 2017; Kim & Cicchetti, 2010; Moulton, Newman, Power, Swanson, & Day, 2015); however, future longitudinal work is needed to establish temporal relations.

Despite our expectations, exposure to deprivation did not predict adolescents' overall regulation. Two possible explanations for the lack of associations are as follows. First, the questionnaire used to assess adolescent regulation in the present study, ACOPE, taps into predetermined forms of regulation, such as ventilating feelings, developing social support, and solving family problems. While the ACOPE captures many adaptive strategies that adolescents use, there may be additional strategies not assessed by ACOPE that do vary as a function of deprivation exposure (e.g., regulation strategies that rely more heavily on cognitive abilities such as cognitive reappraisal or acceptance). Second, it is possible that differences in regulation resulting from deprivation are observed early in development (e.g., Shipman, et al., 2005) but this association diminishes over time. It is of course also possible that the one early observation of this association was hampered by study limitations. Shipman et al. (2005) found that neglected

children tend to inhibit the expression of negative emotions. However, their study was limited to concurrent associations in a small ($N = 24$) sample of 6- to 12-year-olds. In contrast, in the present study, deprivation was assessed prior to age 6, while regulation was measured at age 18. As such, perhaps with time, other environmental or contextual influences worked to reduce emotion dysregulation resulting from lack of cognitive and social stimulation endured by neglected children. Future research should directly test these explanations.

This study offers several methodological strengths resulting from the LONGSCAN study design, although future research would benefit from addressing the limitations in the present work. As mentioned, one notable limitation that should be addressed by future research is the concurrent assessment of adolescent regulation and psychopathology. In LONGSCAN, measures of regulation were not introduced until the age 18 wave of data collection, therefore limiting our ability to address temporal relations between regulation and psychopathology. Future work should investigate how specific regulation strategies predict later symptoms of psychopathology, thus more directly testing any causal associations. Future work should also include additional measures of deprivation. In the present study, we focused on CPS case records of child neglect exposure as our measure of deprivation. While the use of official case records was appropriate for our focus on neglect exposure, other measures of deprivation, such as cognitive stimulation, language complexity, and access to learning tools in the home, should be included to provide a more wholistic assessment of children's deprivation exposure and allow for a more nuanced analysis of DMAP and how the model relates to adolescent regulation tendencies.

Despite these limitations, findings from the present study have important clinical implications. For example, our findings highlight the need to consider the role of specific maladaptive regulation strategies, specifically avoidance, in the treatment and prevention of psychopathology in abuse-exposed children. Many therapy strategies, including cognitive behavioral therapy, focus on improving children's regulation through the implementation of adaptive strategies, such as cognitive reappraisal/restructuring (e.g., Smith et al., 2007). While adaptive regulation is vital to promoting resilience in children exposed to abuse (Cicchetti & Rogosch, 2009), findings from the present study also highlight the need to focus on reducing the use of maladaptive strategies, including avoidance, in abuse-exposed children. Overall, by knowing what strategies these children use and how their use is associated with the development of psychopathology over time, we can better tailor our treatment and prevention efforts thus mitigating the effects of maltreatment exposure and improving the mental health of maltreated youth.

References

Aldao, A., Jazaieri, H., Goldin, P. R., & Gross, J. J. (2014). Adaptive and mal-adaptive emotion regulation strategies: Interactive effects during CBT for social anxiety disorder. *Journal of Anxiety Disorders*, 28, 382–389. doi:10.1016/j.janxdis.2014.03.005

Aldao, A., & Nolen-Hoeksema, S. (2010). Specificity of cognitive emotion regulation strategies: A transdiagnostic examination. *Behaviour Research and Therapy*, 48, 974–983. doi:10.1016/j.brat.2010.06.002

Aldao, A., & Nolen-Hoeksema, S. (2012). When are adaptive strategies most predictive of psychopathology? *Journal of Abnormal Psychology*, 121, 276–281. doi:10.1037/a0023598

Aldao, A., Nolen-Hoeksema, S., & Schweizer, S. (2010). Emotion-regulation strategies across psychopathology: A meta-analytic review. *Clinical Psychology Review*, 30, 217–237. doi:10.1016/j.cpr.2009.11.004

Alink, L. R., Cicchetti, D., Kim, J., & Rogosch, F. A. (2009). Mediating and moderating processes in the relation between maltreatment and psychopathology: Mother-child relationship quality and emotion regulation. *Journal of Abnormal Child Psychology*, 37, 831–843. doi:10.1007/s10802-009-9314-4

Arslan, G. (2017). Psychological maltreatment, coping strategies, and mental health problems: A brief and effective measure of psychological maltreatment in adolescents. *Child Abuse & Neglect*, 68, 96–106. doi:10.1016/j.chiabu.2017.03.023

Barnett, D., Manly, J. T., & Cicchetti, D. (1993). Defining child maltreatment: The interface between policy and research. *Child Abuse, Child Development, and Social Policy*, 8, 7–73.

Beauchaine, T. P. (2015). Future directions in emotion dysregulation and youth psychopathology. *Journal of Clinical Child and Adolescent Psychology*, 44, 875–896. doi:10.1080/15374416.2015.1038827

Bos, K. J., Fox, N., Zeanah, C. H., & Nelson, C. A. (2009). Effects of early psychosocial deprivation on the development of memory and executive function. *Frontiers in Behavioral Neuroscience*, 3, 16. doi:10.3389/neuro.08.016.2009

Burns, E. E., Jackson, J. L., & Harding, H. G. (2010). Child maltreatment, emotion regulation, and posttraumatic stress: The impact of emotional abuse. *Journal of Aggression, Maltreatment, and Trauma*, 19, 801–819. doi:10.1080/10926771.2010.522947

Busso, D. S., McLaughlin, K. A., Brueck, S., Peverill, M., Gold, A. L., & Sheridan, M. A. (2017). Child abuse, neural structure, and adolescent psychopathology: A longitudinal study. *Journal of the American Academy of Child & Adolescent Psychiatry*, 56, 321–328. doi:10.1016/j.jaac.2017.01.013

Busso, D. S., McLaughlin, K. A., & Sheridan, M. A. (2017). Dimensions of adversity, physiological reactivity, and externalizing psychopathology in adolescence: Deprivation and threat. *Psychosomatic Medicine*, 79, 162–171. doi:10.1097/PSY.0000000000000369

Chambers, R., Gullone, E., & Allen, N. B. (2009). Mindful emotion regulation: An integrative review. *Clinical Psychology Review*, 29, 560–572. doi:10.1016/j.cpr.2009.06.005

Cicchetti, D., & Rogosch, F. A. (2009). Adaptive coping under conditions of extreme stress: Multilevel influences on the determinants of resilience in maltreated children. *New Directions for Child and Adolescent Development*, 2009, 47–59. doi:10.1002/cd.242

Cisler, J. M., Olatunji, B. O., Feldner, M. T., & Forsyth, J. P. (2010). Emotion regulation and the anxiety disorders: An integrative review. *Journal of Psychopathology and Behavioral Assessment*, 32, 68–82. doi:10.1007/s10862-009-9161-1

Cline, J. I., Belsky, J., Li, Z., Melhuish, E., Lysenko, L., McFarquhar, T., … Jaffee, S. R. (2015). Take your mind off it: Coping style, serotonin transporter linked polymorphic region genotype (5-HTTLPR), and children's internalizing and externalizing problems. *Development and Psychopathology*, 27, 1129–1143. doi:10.1017/S0954579415000723

Cole, D. A., & Maxwell, S. E. (2003). Testing mediational models with longitudinal data: Questions and tips in the use of structural equation modeling. *Journal of Abnormal Psychology*, 112, 558–577. doi:10.1037/0021-843X.112.4.558

Cole, P. M., Hall, S. E., & Hajal, N. J. (2017). Emotion dysregulation as a vulnerability to psychopathology. In T. P. Beauchaine & S. P. Hinshaw (Eds.), *Child and adolescent psychopathology* (3rd ed., pp. 346–386). Hoboken, NJ: Wiley.

Collins, S., Woolfson, L. M., & Durkin, K. (2014). Effects on coping skills and anxiety of a universal school-based mental health intervention delivered in Scottish primary schools. *School Psychology International*, 35, 85–100. doi:10.1177/0143034312469157

Compas, B. E., Jaser, S. S., Bettis, A. H., Watson, K. H., Gruhn, M. A., Dunbar, J. P., … Thigpen, J. C. (2017). Coping, emotion regulation, and psychopathology in childhood and adolescence: A meta-analysis and narrative review. *Psychological Bulletin*, 143, 939–991. doi:10.1037/bul0000110

Connor-Smith, J. K., & Compas, B. E. (2004). Coping as a moderator of relations between reactivity to interpersonal stress, health status, and internalizing problems. *Cognitive Therapy and Research*, 28, 347–368. doi:10.1023/B:COTR.0000031806.25021.d5

Coyne, L. W., & Thompson, A. D. (2011). Maternal depression, locus of control, and emotion regulatory strategy as predictors of preschoolers' internalizing problems. *Journal of Child and Family Studies*, 20, 873–883. doi:10.1007/s10826-011-9455-2

D'Avanzato, C., Joormann, J., Siemer, M., & Gotlib, I. H. (2013). Emotion regulation in depression and anxiety: Examining diagnostic specificity and stability of strategy use. *Cognitive Therapy and Research*, 37, 968–980. doi:10.1007/s10608-013-9537-0

Derogatis, L. R., & Spencer, P. M. (1993). *Brief Symptom Inventory: BSI*. Upper Saddle River, NJ: Pearson.

Downey, L. A., Johnston, P. J., Hansen, K., Birney, J., & Stough, C. (2010). Investigating the mediating effects of emotional intelligence and coping on problem behaviours in adolescents. *Australian Journal of Psychology*, 62, 20–29. doi:10.1080/00049530903312873

English, D. J., & Longscan Investigators. (1997). *Modified Maltreatment Classification System* (MMCS). Retrieved from http://www.iprc.unc.edu/longscan

Filipas, H. H., & Ullman, S. E. (2006). Child sexual abuse, coping responses, self-blame, posttraumatic stress disorder, and adult sexual revictimization. *Journal of Interpersonal Violence*, 21, 652–672. doi:10.1177/0886260506286879

Flannery, D. J., Singer, M., Williams, L., & Castro, P. (1998). Adolescent violence exposure and victimization at home: Coping and psychological trauma symptoms. *International Review of Victimology*, 6, 29–48. doi:10.1177/026975809800600103

Flett, G. L., Druckman, T., Hewitt, P. L., & Wekerle, C. (2012). Perfectionism, coping, social support, and depression in maltreated adolescents. *Journal of Rational–Emotive & Cognitive-Behavior Therapy*, 30, 118–131. doi:10.1007/s10942-011-0132-6

Garnefski, N., Kraaij, V., & Spinhoven, P. (2001). Negative life events, cognitive emotion regulation and emotional problems. *Personality and Individual differences*, 30, 1311–1327. doi:10.1016/S0191-8869(00)00113-6

Gross, J. J. (2014). *Emotion regulation: Conceptual and empirical foundations*. New York: Guilford Press.

Hager, A. D., & Runtz, M. G. (2012). Physical and psychological maltreatment in childhood and later health problems in women: An exploratory investigation of the roles of perceived stress and coping strategies. *Child Abuse & Neglect*, 36, 393–403. doi:10.1016/j.chiabu.2012.02.002

Holt, S., Buckley, H., & Whelan, S. (2008). The impact of exposure to domestic violence on children and young people: A review of the literature. *Child Abuse & Neglect*, 32, 797–810. doi:10.1016/j.chiabu.2008.02.004

Horwitz, A. G., Hill, R. M., & King, C. A. (2011). Specific coping behaviors in relation to adolescent depression and suicidal ideation. *Journal of Adolescence*, 34, 1077–1085. doi:10.1016/j.adolescence.2010.10.004

Kim, J., & Cicchetti, D. (2010). Longitudinal pathways linking child maltreatment, emotion regulation, peer relations, and psychopathology. *Journal of*

Child Psychology and Psychiatry, 51, 706–716. doi:10.1111/j.1469-7610.2009.02202.x

Kim-Spoon, J., Cicchetti, D., & Rogosch, F. A. (2013). A longitudinal study of emotion regulation, emotion lability-negativity, and internalizing symptomatology in maltreated and nonmaltreated children. *Child Development*, 84, 512–527. doi:10.1111/j.1467-8624.2012.01857.x

Lambert, H. K., King, K. M., Monahan, K. C., & McLaughlin, K. A. (2017). Differential associations of threat and deprivation with emotion regulation and cognitive control in adolescence. *Development and Psychopathology*, 29, 929–940. doi:10.1017/S0954579416000584

Lazarus, R. S., & Folkman, S. (1984). *Stress, appraisal, and coping*. Berlin: Springer.

Leporé, N., Voss, P., Lepore, F., Chou, Y. Y., Fortin, M., Gougoux, F., … Toga, A. W. (2010). Brain structure changes visualized in early- and late-onset blind subjects. *Neuroimage*, 49, 134–140. doi:10.1016/j.neuroimage.2009.07.048

Machmutow, K., Perren, S., Sticca, F., & Alsaker, F. D. (2012). Peer victimisation and depressive symptoms: Can specific coping strategies buffer the negative impact of cybervictimisation? *Emotional and Behavioural Difficulties*, 17, 403–420. doi:10.1080/13632752.2012.704310

Maughan, A., & Cicchetti, D. (2002). Impact of child maltreatment and interadult violence on children's emotion regulation abilities and socioemotional adjustment. *Child Development*, 73, 1525–1542. doi:10.1111/1467-8624.00488

McConnell, M. M., Memetovic, J., & Richardson, C. G. (2014). Coping style and substance use intention and behavior patterns in a cohort of BC adolescents. *Addictive Behaviors*, 39, 1394–1397. doi:10.1016/j.addbeh.2014.05.018

McCubbin, H. I., Thompson, A. I., & McCubbin, M. A. (2001). *Family measures: Stress, coping & resiliency*. Honolulu, HI: Kamehameha Schools.

McLaughlin, K. A., Green, J. G., Gruber, M. J., Sampson, N. A., Zaslavsky, A. M., & Kessler, R. C. (2010). Childhood adversities and adult psychiatric disorders in the national comorbidity survey replication: II. Associations with persistence of DSM-IV disorders. *Archives of General Psychiatry*, 67, 124–132. doi:10.1001/archgenpsychiatry.2009.187

McLaughlin, K. A., Green, J. G., Gruber, M. J., Sampson, N. A., Zaslavsky, A. M., & Kessler, R. C. (2012). Childhood adversities and first onset of psychiatric disorders in a national sample of US adolescents. *Archives of General Psychiatry*, 69, 1151–1160. doi:10.1001/archgenpsychiatry.2011.2277

McLaughlin, K. A., Peverill, M., Gold, A. L., Alves, S., & Sheridan, M. A. (2015). Child maltreatment and neural systems underlying emotion regulation. *Journal of the American Academy of Child & Adolescent Psychiatry*, 54, 753–762. doi:10.1016/j.jaac.2015.06.010

McLaughlin, K. A., Sheridan, M. A., Alves, S., & Mendes, W. B. (2014). Child maltreatment and autonomic nervous system reactivity: Identifying dysregulated stress reactivity patterns using the biopsychosocial model of challenge and threat. *Psychosomatic Medicine*, 76, 538–546. doi:10.1097/PSY.0000000000000098

McLaughlin, K. A., Sheridan, M. A., Gold, A. L., Duys, A., Lambert, H. K., Peverill, M., … Pine, D. S. (2016). Maltreatment exposure, brain structure, and fear conditioning in children and adolescents. *Neuropsychopharmacology*, 41, 1956–1964. doi:10.1038/npp.2015.365

Messman-Moore, T. L., & Bhuptani, P. H. (2017). A review of the long-term impact of child maltreatment on posttraumatic stress disorder and its comorbidities: An emotion dysregulation perspective. *Clinical Psychology Science and Practice*, 24, 154–169. doi:10.1111/cpsp.12193

Miller, A. B., Sheridan, M. A., Hanson, J. L., McLaughlin, K. A., Bates, J. E., Lansford, J. E., … Dodge, K. A. (2018). Dimensions of deprivation and threat, psychopathology, and potential mediators: A multi-year longitudinal analysis. *Journal of Abnormal Psychology*, 127, 160–170. doi:10.1037/abn0000331

Milojevich, H. M., Levine, L. J., Cathcart, E. J., & Quas, J. A. (2018). The role of maltreatment in the development of coping strategies. *Journal of Applied Developmental Psychology*, 54, 23–32. doi:10.1016/j.appdev.2017.10.005

Moulton, S. J., Newman, E., Power, K., Swanson, V., & Day, K. (2015). Childhood trauma and eating psychopathology: A mediating role for dissociation and emotion dysregulation? *Child Abuse & Neglect*, 39, 167–174. doi:10.1016/j.chiabu.2014.07.003

Muthén, L. K., & Muthén, B. O. (1998–2017). *Mplus user's guide* (7th ed.). Los Angeles: Author.

O'Kusky, J. R. (1985). Synapse elimination in the developing visual cortex: A morphometric analysis in normal and dark-reared cats. *Brain Research*, 22, 81–91. doi:10.1016/0165-3806(85)90071-9

O'Mahen, H. A., Karl, A., Moberly, N., & Fedock, G. (2015). The association between childhood maltreatment and emotion regulation: Two different mechanisms contributing to depression? *Journal of Affective Disorders*, 174, 287–295. doi:10.1016/j.jad.2014.11.028

Patterson, J. M., & McCubbin, H. I. (1987). Adolescent coping style and behaviors: Conceptualization and measurement. *Journal of Adolescence*, 10, 163–186. doi:10.1016/S0140-1971(87)80086-6

Peh, C. X., Shahwan, S., Fauziana, R., Mahesh, M. V., Sambasivam, R., Zhang, Y., … Subramaniam, M. (2017). Emotion dysregulation as a mechanism linking child maltreatment exposure and self-harm behaviors in adolescents. *Child Abuse and Neglect*, 67, 383–390. doi:10.1016/j.chiabu.2017.03.013

Perlman, M. R., Dawson, A. E., Dardis, C. M., Egan, T., & Anderson, T. (2016). The association between childhood maltreatment and coping strategies: The indirect effect through attachment. *Journal of Genetic Psychology*, 177, 156–171. doi:10.1080/00221325.2016.1220912

Pollak, S. D., Cicchetti, D., Hornung, K., & Reed, A. (2000). Recognizing emotion in faces: Developmental effects of child abuse and neglect. *Developmental Psychology*, 36, 679–688. doi: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, 242–247. doi:10.1016/j.cognition.2008.10.010

Raykov, T. (2005). Analysis of longitudinal studies with missing data using covariance structure modeling with full-information maximum likelihood. *Structural Equation Modeling*, 12, 493–505. doi:10.1207/s15328007sem1203_8

Richters, J. E., & Martinez, P. (1992). *Things I've Seen and Heard: A structured interview for assessing young children's violence exposure*. Washington, DC: National Institute of Mental Health.

Romens, S. E., & Pollak, S. D. (2012). Emotion regulation predicts attention bias in maltreated children at-risk for depression. *Journal of Child Psychology and Psychiatry*, 53, 120–127. doi:10.1111/j.1469-7610.2011.02474.x

Rosario, M., Salzinger, S., Feldman, R. S., & Ng-Mak, D. S. (2003). Community violence exposure and delinquent behaviors among youth: The moderating role of coping. *Journal of Community Psychology*, 31, 489–512. doi:10.1002/jcop.10066

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. doi:10.1016/j.neuroimage.2018.02.043

Runyan, D. K., Curtis, P. A., Hunter, W. M., Black, M. M., Kotch, J. B., Bangdiwala, S., … Landsverk, J. (1998). LONGSCAN: A consortium for longitudinal studies of maltreatment and the life course of children. *Aggression and Violent Behavior*, 3, 275–285. doi:10.1016/S1359-1789(96)00027-4

Sarsour, K., Sheridan, M., Jutte, D., Nuru-Jeter, A., Hinshaw, S., & Boyce, W. T. (2011). Family socioeconomic status and child executive functions: The roles of language, home environment, and single parenthood. *Journal of the International Neuropsychological Society*, 17, 120–132. doi:10.1017/S1355617710001335

Schafer, J. L., & Graham, J. W. (2002). Missing data: Our view of the state of the art. *Psychological Methods*, 7, 147–177. doi:10.1037/1082-989X.7.2.147

Schäfer, J. Ö., Naumann, E., Holmes, E. A., Tuschen-Caffier, B., & Samson, A. C. (2017). Emotion regulation strategies in depressive and anxiety symptoms in youth: A meta-analytic review. *Journal of Youth and Adolescence*, 46, 261–276. doi:10.1007/s10964-016-0585-0

Schwartz, D., & Proctor, L. J. (2000). Community violence exposure and children's social adjustment in the school peer group: The mediating roles of emotion regulation and social cognition. *Journal of Consulting and Clinical Psychology*, 68, 670–683. doi:10.1037/0022-006X.68.4.670

Seiffge-Krenke, I., & Klessinger, N. (2000). Long-term effects of avoidant coping on adolescents' depressive symptoms. *Journal of Youth and Adolescence*, 29, 617–630. doi:10.1023/A:1026440304695

Shaffer, D., Fisher, P., Lucas, C. P., Dulcan, M. K., & Schwab-Stone, M. E. (2000). NIMH Diagnostic Interview Schedule for Children Version IV (NIMH DISC-IV): Description, differences from previous versions, and reliability of

some common diagnoses. *Journal of the American Academy of Child & Adolescent Psychiatry*, *39*, 28–38. doi:10.1097/00004583-200001000-00014

Sheridan, M. A., & McLaughlin, K. A. (2014). Dimensions of early experience and neural development: Deprivation and threat. *Trends in Cognitive Sciences*, *18*, 580–585. doi:10.1016/j.tics.2014.09.001

Sheridan, M. A., & McLaughlin, K. A. (2016). Neurobiological models of the impact of adversity on education. *Current Opinion in Behavioral Sciences*, *10*, 108–113. doi:10.1016/j.cobeha.2016.05.013

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*, 1777–1794. doi:10.1017/S0954579417001390

Sheridan, M. A., Sarsour, K., Jutte, D., D'Esposito, M., & Boyce, W. T. (2012). The impact of social disparity on prefrontal function in childhood. *PLOS ONE*, *7*, e35744. doi:10.1371/journal.pone.0035744

Shields, A., & Cicchetti, D. (1998). Reactive aggression among maltreated children: The contributions of attention and emotion dysregulation. *Journal of Clinical Child Psychology*, *27*, 381–395. doi:10.1207/s15374424jccp2704_2

Shields, A., Ryan, R. M., & Cicchetti, D. (2001). Narrative representations of caregivers and emotion dysregulation as predictors of maltreated children's rejection by peers. *Developmental Psychology*, *37*, 321–337. doi:10.1037/0012-1649.37.3.321

Shipman, K., Edwards, A., Brown, A., Swisher, L., & Jennings, E. (2005). Managing emotion in a maltreating context: A pilot study examining child neglect. *Child Abuse & Neglect*, *29*, 1015–1029. doi:10.1016/j.chiabu.2005.01.006

Shipman, K. L., Schneider, R., Fitzgerald, M. M., Sims, C., Swisher, L., & Edwards, A. (2007). Maternal emotion socialization in maltreating and non-maltreating families: Implications for children's emotion regulation. *Social Development*, *16*, 268–285. doi:10.1111/j.1467-9507.2007.00384.x

Silk, J. S., Steinberg, L., & Morris, A. S. (2003). Adolescents' emotion regulation in daily life: Links to depressive symptoms and problem behavior. *Child Development*, *74*, 1869–1880. doi:10.1046/j.1467-8624.2003.00643.x

Silverman, A. B., Reinherz, H. Z., & Giaconia, R. M. (1996). The long-term sequelae of child and adolescent abuse: A longitudinal community study. *Child Abuse & Neglect*, *20*, 709–723. doi:10.1016/0145-2134(96)00059-2

Smith, P., Yule, W., Perrin, S., Tranah, T., Dalgleish, T., & Clark, D. M. (2007). Cognitive-behavioral therapy for PTSD in children and adolescents: A preliminary randomized controlled trial. *Journal of the American Academy of Child & Adolescent Psychiatry*, *46*, 1051–1061. doi:10.1097/CHI.0b013e318067e288

Sontag, L. M., & Graber, J. A. (2010). Coping with perceived peer stress: Gender-specific and common pathways to symptoms of psychopathology. *Developmental Psychology*, *46*, 1605–1620.

Straus, M. A. (1979). Measuring intrafamily conflict and violence: The Conflict Tactics Scales. *Journal of Marriage and the Family*, *41*, 75–88.

Street, A. E., Gibson, L. E., & Holohan, D. R. (2005). Impact of childhood traumatic events, trauma-related guilt, and avoidant coping strategies on PTSD symptoms in female survivors of domestic violence. *Journal of Traumatic Stress*, *18*, 245–252. doi:10.1002/jts.20026

Thabet, A. A. M., Tischler, V., & Vostanis, P. (2004). Maltreatment and coping strategies among male adolescents living in the Gaza Strip. *Child Abuse & Neglect*, *28*, 77–91. doi:10.1016/j.chiabu.2002.12.002

Thompson, R. A. (1994). Emotion regulation: A theme in search of definition. *Monographs of the Society for Research in Child Development*, *59*, 25–52. doi:10.1111/j.1540-5834.1994.tb01276.x

Tibu, F., Sheridan, M. A., McLaughlin, K. A., Nelson, C. A., Fox, N. A., & Zeanah, C. H. (2016). Disruptions of working memory and inhibition mediate the association between exposure to institutionalization and symptoms of attention deficit hyperactivity disorder. *Psychological Medicine*, *46*, 529–541. doi:10.1017/S0033291715002020

Warmingham, J. M., Handley, E. D., Rogosch, F. A., Manly, J. T., & Cicchetti, D. (2018). Identifying maltreatment subgroups with patterns of maltreatment subtype and chronicity: A latent class analysis approach. *Child Abuse & Neglect*. Advance online publication. doi:10.1016/j.chiabu.2018.08.013

Wilkinson, G. S. (1993). *WRAT-3: Wide Range Achievement Test administration manual*. Wilmington, DE: Wide Range.