

Threat and Deprivation: Early Adversities as Predictors of
Child and Adolescent Internalizing and Externalizing Psychopathology

By

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To my parents, Gail and Dennis Henry,
who have encouraged me to pursue a career that challenges and excites me
and
To my advisor, Bruce Compas,
who has supported me throughout my graduate work

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INTRODUCTION

Stress is a risk factor for the development of numerous physical and psychological symptoms and disorders, and stress experienced early in life is particularly pernicious (Juster, McEwen, & Lupien, 2010; Shonkoff et al., 2012). Early abuse and neglect are powerful predictors of later psychopathology (Anthonysamy & Zimmer-Gembeck, 2007; Felitti et al., 1998; Gilbert et al., 2009; Rogosch, Cicchetti, & Aber, 1995). In 2014, an estimated 702,000 children in the United States were victims of abuse or neglect (US Department of Health and Human Services, 2016). Given the profound impacts and prevalence of early adverse experiences, applying the most parsimonious methods and frameworks for operationalizing this construct in research is integral to enhance our understanding of early adversity and the mechanisms by which maladaptive outcomes occur.

Early adversity is captured by various terminologies, including early life stress (ELS), adverse childhood experiences (ACEs), maltreatment, and trauma. The current paper will refer to aberrations in the caretaking environment that contribute to normative child development as early adverse experiences. Frequently studied early adverse experiences include physical, sexual, and emotional abuse, neglect, poverty, exposure to natural disaster or medical trauma, parental death or divorce, and caregiver impairment such as psychopathology, substance abuse, and criminal behavior. Early adversities, in general, are related to most types of psychopathology, including internalizing and externalizing disorders, substance abuse, and psychotic symptoms (Andersen & Teicher, 2009; Gilbert et al., 2009; McGrath et al., 2017). Exposure to early adversity often co-occurs with genetic and environmental risk factors (e.g., parental psychopathology, family discord, low socioeconomic status) that are independently associated with poor outcomes later in life (Turner et al., 2012). However, behavioral genetics studies

suggest that the relation between early adversity and psychopathology is only partially accounted for by these factors (e.g., Kendler et al., 2000).

Initial research on early adverse experiences examined risk factors in isolation (e.g., physical abuse, neglect). However, most children who have been exposed to one type of adversity have also experienced numerous others (Finkelhor, Ormrod, & Turner, 2007; Green et al., 2010; McLaughlin et al., 2012). Rutter (1979, 1981) was one of the first to observe a non-linear relation between early adversity and child development, such that children experiencing a single physical or psychosocial risk factor suffer few maladaptive outcomes, whereas children with multiple risk factors are more likely to develop psychological disorders. These findings motivated the study of the effects of multiple risk factor exposures in children (Sameroff, Seifer, Zax, & Barocas, 1987).

The Adverse Childhood Experiences (ACEs) study is one of the largest investigations into the associations between early adversity and later health and wellbeing. In the seminal paper from the ACEs study, Felitti et al. (1998) found a dose-response effect; as compared to adults with no early adverse experiences, those who had experienced four or more adversities were at an increased risk for developing psychological and physical illness. As such, the gold standard for determining risk for problems due to early adversity became the cumulative risk model, which tallies the number of distinct adversities experienced by an individual to generate a continuous risk score (Evans, Li, & Whipple, 2013). The cumulative risk approach has several notable strengths. Studies applying the cumulative risk model to understand the effects of early adversity have had significant impacts on public health, directing attention and resources to research and intervention. Further, cumulative risk scores have served as screening tools to identify children in greatest need of intervention (McLaughlin & Sheridan, 2016). Yet, without

considering trauma type or severity, the cumulative risk model implicitly assumes that different experiences influence development through the same underlying mechanisms and all early adversities are equal in their impact on child development (Evans et al., 2013; Schilling Aseltine, & Gore, 2008).

In spite of the important findings that have come from research using the cumulative risk model, emerging research suggests that there may be some specificity in the mechanisms by which early adversity relates to psychopathology. For example, Pollak, Cicchetti, Hornung, and Reed (2000) found that preschool children who had experienced physical abuse displayed different patterns of performance on an emotional discrimination task as compared to those who had experienced neglect. However, research that has identified links between specific types of early adversity and psychopathology has been limited. In reviewing more than 200 studies, McMahon et al. (2003) found little evidence for specificity in the relation between early adversities (e.g., exposure to violence, abuse, marital conflict, poverty, illness) and internalizing and externalizing symptoms in children and adolescents. Epidemiologic studies have examined specificity in these associations, as well. Kessler et al. (2010) and Green et al. (2010) used data from the World Mental Health and National Comorbidity Surveys, respectively, to detect relations between early adversities and psychopathology. Although both studies identified associations between these key variables, the relations were non-specific.

McLaughlin, Sheridan, and colleagues (McLaughlin & Sheridan, 2016; McLaughlin, Sheridan & Lambert, 2014; Sheridan & McLaughlin, 2014) proposed the Dimensional Model of Adversity and Psychopathology (DMAP) as a framework through which early adverse experiences are distilled into core dimensions of threat and deprivation. DMAP posits that exposure to threatening stimuli and environmental deprivation affect learning and emotional,

cognitive, and neurobiological development in ways that are at least partially distinct. The authors define threat as experiences involving threat of harm or actual harm and deprivation as experiences involving the absence of expected and typical environmental inputs. Sheridan and McLaughlin (2014) focused primarily on neurobiological evidence to provide a theoretical basis for DMAP. In human and animal studies, exposure to threatening experiences early in life has been associated with reduced hippocampal volume and functioning (Teicher, Anderson, & Polcari, 2012), increased amygdala activity in response to novel stimuli (McCrory et al., 2011), and reduced ventromedial prefrontal cortex volume (Hanson et al., 2010). With regard to deprivation, studies of early social isolation in rats show disruptions in higher order cognitive functioning (e.g., inhibitory control) and paralleled neurochemical changes, including dopamine turnover in the prefrontal cortex and enhanced dopaminergic function in the dorsal and ventral striatum (Würbel, 2001). In humans, children reared in deprived environments exhibit reductions in cortical thickness in the association cortex and disruptions in prefrontal cortex function, including declines in executive functioning and memory (McLaughlin et al., 2014; Sheridan, Fox, Zeanah, McLaughlin, & Nelson, 2012).

A small subset of research has begun to use DMAP to better understand the association between early adversity and psychosocial constructs, and several studies have examined DMAP in relation to potential mediators of psychopathology. For example, Platt et al. (2017) examined DMAP as it relates to intelligence. The authors classified 11 adversities as threat (physical abuse, domestic violence, sexual abuse, violent victimization, witnessing violence, emotional abuse) and deprivation (financial insecurity, food insecurity, neglect, poverty, low parental education) using the theoretical DMAP model and examined associations with fluid intelligence. Select threat (i.e., physical abuse and witnessing domestic violence) and deprivation (i.e., poverty and

low parental education) events were related to lower fluid intelligence, but the association was stronger for deprivation events than threat events. Lambert, King, Monahan, and McLaughlin (2016) looked at the relation between DMAP and emotion regulation and cognitive control. They found threat (i.e., exposure to violence) to be associated with deficits in automatic emotion regulation but not cognitive control, and they found deprivation (i.e., poverty) to be related to deficits in cognitive control but not automatic emotion regulation. The cumulative risk approach (i.e., total number of adversities) concealed these specific associations, such that more adversities were associated with reduced switching ability on a cold task measuring cognitive control, only.

DMAP does not explicitly hypothesize that deprivation and threat are associated with distinct psychopathologies. Rather, the model posits that DMAP explains different mediators of similar outcomes. However, research has found some specificity in the relation between threat and deprivation and psychopathology. In a longitudinal study, Miller et al. (2018) operationalized deprivation as lack of environmental enrichment (i.e., age-appropriate toys, a safe play area, and the availability of books) and threat as physical abuse and harsh discipline. They found that deprivation was indirectly related to more externalizing symptoms via deficits in verbal abilities, and threat was directly related to more internalizing and externalizing symptoms. The authors speculated that altered emotional processing may mediate the relation between threat and psychopathology, but they did not test this possibility in their study. In addition, Busso, McLaughlin, and Sheridan (2016) examined associations among threat (i.e., exposure to interpersonal violence) and deprivation (i.e., poverty), physiological reactivity, and psychopathology. They found that threat (but not deprivation) was associated with physiological reactivity in youth on the Trier Social Stress Test. Similar to findings from Miller et al. (2018), threat was associated with greater levels of internalizing and externalizing symptoms, and

deprivation was associated with more externalizing symptoms, only. The relation between threat and externalizing symptoms was mediated by blunted physiological reactivity.

The methodology used to measure adverse events is an important consideration for research, and one that is highly contested (e.g., Brown, Cohen, Johnson, & Salzinger, 1998; Shaffer, Huston, & Egeland, 2008). Prospective and retrospective approaches have been examined in the literature, and both methods have advantages and shortcomings. For example, while prospective designs guard against problems due to error in recall, validity of these data may be impacted by factors such as fear of disclosure (Kalichman, 1993). Further, various sources (e.g., self-report, caregiver report, caseworker report, Child Protective Services [CPS] documentation) could provide data on early adversities, and the concordance among reporters and the predictive validity of their ratings vary. For example, McGee, Wolfe, Yuen, Wilson, and Carnochan (1995) compared adolescent self-report, caseworker report, and researcher ratings of CPS documentation of early adversities (i.e., physical abuse, sexual abuse, emotional abuse, family violence, and neglect). Although there was good concordance between caseworker report and file reviews, agreement between caseworkers and adolescents varied by adversity type, with the highest for sexual abuse (90%) and the lowest for neglect (60%). In a study of 350 early adolescents, self-report of physical, sexual, and psychological abuse was four to six times higher than those found in CPS records, and psychological adjustment was more strongly associated with self-reports than CPS determinations (Everson et al., 2008).

Relatedly, sample selection is an integral aspect of study design and data interpretation, and various research- and service-based approaches can provide pathways to better understand youths exposed to early adversity. A common research-based method is recruiting and screening participants from the community. For example, in their study examining stress reactivity in

children exposed to early adversity, McLaughlin, Alves, and Sheridan (2014) recruited participants from schools, after-school programs, and medical clinics in a large northeastern city, targeting impoverished neighborhoods with high levels of violence. Epidemiologic surveys with population-level samples have also been used (e.g., National Comorbidity Survey Replication, Carliner et al., 2017; World Mental Health Survey, McGrath et al., 2017). Service-based opportunities involve analyzing data from assessments already implemented through the child welfare system. Child welfare policies such as the Adoption and Safe Families Act (1997) and the Fostering Connections to Success and Increasing Adoptions Act (2008) have encouraged CPS to monitor, and take measures to improve, child wellbeing. Assessments vary by state but include the Child and Adolescent Functional Assessment Scale, the Child Behavior Checklist and related tools from the Achenbach System of Empirically Based Assessment, and the Child and Adolescent Needs and Strengths (CANS) (Rosanbalm et al., 2016).

The CANS is a tool developed to support clinical decision-making for child welfare professionals (Praed Foundation, 2015). A child's entrance into state custody triggers the initial administration of the CANS. Typically, children enter state custody as a consequence of exposure to early adverse experiences (e.g., physical or sexual abuse, neglect, parental substance abuse) or a court order for delinquent and unruly behaviors. Caseworkers complete the CANS about a child using their aggregate knowledge from various sources (e.g., child, biological parents, foster parents, teachers). The current research uses data from the CANS to understand early adversities and psychopathology in children and adolescents.

Current Studies

As summarized above, select studies have examined the relation between DMAP and psychopathology. The extant research has classified early adversities as threat or deprivation

based on DMAP theory. Further, this work has focused on a narrow subtype and small number of early adverse experiences. The current research attempts to first, provide the first empirical classification of early adversities as threat and deprivation and second, use this empirical DMAP classification to better understand the relation between early adversity and psychopathology.

Study 1. Professionals in psychology rated 10 adversities categorically as either deprivation or threat. I hypothesized that physical abuse, sexual abuse, emotional abuse, medical trauma, natural disaster, witness to family violence, and witness to community violence would be categorized as threat. I hypothesized that neglect, caregiver substance abuse, and caregiver mental illness would be categorized as deprivation.

Study 2. The categorical classifications obtained from Study 1 were applied to examine the association between the cumulative risk model and DMAP and psychopathology. First, I hypothesized that higher cumulative risk scores would predict more internalizing and externalizing symptoms. Second, I hypothesized higher threat scores would predict more internalizing and externalizing symptoms after controlling for levels of deprivation and higher deprivation scores would predict more externalizing symptoms after controlling for levels of threat. Third, I hypothesized that DMAP would explain more of the variance in psychopathology than the cumulative risk model.

STUDY 1

Method

Participants. Professionals in psychology were recruited via personal email and postings on psychology and trauma-related list serves. The study sample consisted of sixty-six professionals in psychology. Fifty-six percent of participants had a master's degree, 35% had a doctoral degree, 8% had a bachelor's degree, and 1% had an alternative degree (i.e., Ed. S.).

With regard to the type of professional involvement with children who had early adverse experiences, the majority of participants (68%) were exclusively in clinical practice or were child welfare professionals. The remaining participants served dual roles as clinical practitioners or child welfare professionals and researchers of early adverse experiences (23%), had little or no involvement with children who had experienced early adversity (6%), or were exclusively involved in research with children with early adverse experiences (3%). Eighty-six percent of participants reported having a lot of knowledge about early adversities in children, as compared to a little (12%) or none (2%).

Procedure. An online questionnaire was developed for the purposes of Study 1 (Qualtrics, Provo, UT). First, participants were asked to provide demographic information, including level of education, experience with children exposed to adverse experiences, and extent of knowledge of children exposed to adverse experiences. Next, participants were presented with the terms “threat” and “deprivation” and their definitions. As defined by Sheridan and McLaughlin (2014), threat was described as “the presence of an atypical (i.e., unexpected) experience characterized by actual or threatened death, injury, sexual violation, or other harm to one’s physical integrity,” and deprivation was described as “the absence of expected environmental inputs in cognitive (e.g., language) and social domains as well as the absence of species- and age-typical complexity in environmental stimulation.” Then, participants were presented with 10 early adversities (i.e., physical abuse, sexual abuse, medical trauma, natural disaster, family violence, community violence, neglect, emotional abuse, caregiver substance abuse, and caregiver mental illness) and asked to complete a forced-choice task in which they decided whether each experience reflected "threat" or "deprivation." Instructions stated, “If you

believe a traumatic experience contains elements of both ‘threat’ and ‘deprivation,’ do your best to select a single term that best captures the experience.”

Results

The majority of participants categorized sexual abuse (100%), physical abuse (99%), natural disaster (91%), medical trauma (88%), witness to family violence (85%), and witness to community violence (83%) as threat. The majority of participants categorized neglect (97%), caregiver mental illness (80%), caregiver substance abuse (79%), and emotional abuse (67%) as deprivation. Thus, all 10 adversities were classified as either threat or deprivation.

STUDY 2

Method

Participants. The full sample consisted of cross-sectional data collected from 27,948 children and adolescents in state custody in a southeastern state between 2012 and 2017. Of the 27,948 youth in the full sample, 1,548 were missing data on one or more key variables used in the current analyses and were therefore deleted listwise from the dataset. Specifically, 1,441 cases were excluded because they fell outside of the age range (i.e., age 5 to 18); 94 cases were excluded because of missing data on age, gender, or race variables; and 13 cases were excluded because of miscoded data (i.e., data that fell outside of the 0 – 3 scale) on neglect, emotional abuse, witness to family violence, caregiver substance abuse, and caregiver mental illness variables. In total, 1,548 participants, or 5.54 % of the dataset, were lost to listwise deletion of cases due to missing data.

The present analyses include data from 26,400 children and adolescents. Participants were primarily white and male (68% white; 58% male); 32% of participants were nonwhite (i.e.,

24% Black, 8% Multiracial/Other/Unable to determine, and <1% American India/Alaska Native).

Participants ranged in age from 5 to 18 years old ($M = 12.93$, $SD = 4.12$).

Measures. The Child and Adolescent Needs and Strengths (CANS) is based on the Theory of Communities (Lyons, 2009), which posits that the primary purpose of measurement for human serving enterprises is communication, and tools should be optimized accordingly. The CANS was designed so that youth and family characteristics could be described completely and concisely to support clinical decision-making without labor-intensive scoring procedures. To use the tool, an individual must have a bachelor's degree, and certification in the CANS requires reliability of .70 or higher on a case vignette (Praed Foundation, 2015). Anderson et al. (2003) found item-level inter-rater reliabilities to range from .55 to .90. The average reliability of the CANS is .75 with vignettes, .84 with case records, and some research has shown reliability to be greater than .90 with live cases.

All key variables used in the current study are items, or calculated composites of items, from archival CANS data collected between 2012 and 2017 on children and adolescents in a southeastern state. All CANS items are scored on a 4-point scale, ranging from 0 to 3. Although descriptors for levels of the 4-point scale differ slightly by item, generally, 0 indicates no evidence or absence of an adversity or symptom, and 3 indicates frequent and severe exposure to an adversity or severe experience of a symptom. Demographic data (i.e., age, gender, and race) were integrated into the de-identified CANS dataset that was provided to the researchers by the Department of Children's Services (DCS).

Data Analytic Approach. In addition to the aforementioned 1,548 excluded participants, 2,620 participants were missing data on the caregiver substance abuse and caregiver mental illness variables. On the CANS, the caregiver substance abuse and caregiver mental illness

variables are only completed for youths with identified permanency caregivers. Rather than excluding these 2,620 participants due to these missing data, all 2,620 participants were coded as having a “0” on these variables, which indicates, “caregiver has no substance abuse/mental illness needs.” As such, a conservative approach was taken by likely under-reporting early adversities in these youths. The 2,620 participants with missing data were significantly different than the 23,780 participants without missing data on all key variables. Participants missing data were significantly younger in age ($M = 12.38$, $SD = 4.39$) than participants with data ($M = 12.99$, $SD = 4.09$), were more likely to be female ($M = .56$, $SD = .50$) than participants with data ($M = .58$, $SD = .49$), were more likely to be nonwhite ($M = .41$, $SD = .49$) than participants with data ($M = .31$, $SD = .46$), had fewer internalizing symptoms ($M = .34$, $SD = .31$) than participants with data ($M = .38$, $SD = .32$), had fewer externalizing symptoms ($M = 4.59$, $SD = 4.95$) than participants with data ($M = 6.09$, $SD = 5.88$), had a lower cumulative risk score ($M = 2.29$, $SD = 3.06$) than participants with data ($M = 3.61$, $SD = 3.37$), had a lower deprivation score ($M = .96$, $SD = 1.33$) than participants with data ($M = 2.46$, $SD = 2.28$), and had a higher threat score ($M = .25$, $SD = .31$) than participants with data ($M = .23$, $SD = .29$).

Five composites were created for the three independent variables (i.e., cumulative risk, threat, and deprivation) and the two dependent variables (i.e., internalizing symptoms and externalizing symptoms). The cumulative risk composite was created by summing scores for all 10 adversities (i.e., physical abuse, sexual abuse, medical trauma, natural disaster, family violence, and community violence, neglect, emotional abuse, caregiver substance abuse, and caregiver mental illness; Cronbach’s $\alpha = .67$). Composites for threat and deprivation were derived empirically using the participant ratings of early adversities as threat or deprivation from Study 1. The threat composite was created by summing six adversities: physical abuse, sexual

abuse, medical trauma, natural disaster, family violence, and community violence (Cronbach's $\alpha = .57$). The deprivation composite was created by summing four adversities: neglect, emotional abuse, caregiver substance abuse, and caregiver mental illness (Cronbach's $\alpha = .55$).

To create the composites for the dependent variables, CANS items were grouped theoretically. The internalizing and externalizing symptom composites for the current study were modeled after the internalizing and externalizing problems scales from the Child Behavior Checklist (CBCL; Achenbach & Rescorla, 2001). The CBCL is a questionnaire measuring adaptive and maladaptive functioning in children and adolescents 6 through 18 years old. The internalizing problems scale is comprised of items from the anxious/depressed, withdrawn/depressed, and somatic complaints scales. The externalizing problems scale is comprised of items from the rule breaking behavior and aggressive behavior domains. As such, the following six CANS items were included in the internalizing symptoms composite: suicide risk, anxiety, depression, medical, physical, and sleep (Cronbach's $\alpha = .69$). The following 12 CANS items were included in the externalizing symptoms composite: substance abuse, fire setting, runaway, sanction seeking behavior, sexually reactive behavior, delinquency, legal, anger control, sexual aggression, oppositional, conduct, and danger to others (Cronbach's $\alpha = .86$).

Log transformations were conducted on all composite variables with skew >1 : cumulative risk, threat, and internalizing symptoms. Bivariate correlations were subsequently calculated to examine associations among demographic variables, early adversity variables, cumulative risk, threat, and deprivation composites, and internalizing and externalizing symptoms. Multiple regression analyses examined the relation between early adversity (i.e.,

cumulative risk, threat, and deprivation) and psychopathology (i.e., internalizing and externalizing symptoms).

Results

Descriptive Statistics. Table 1 presents means, standard deviations, ranges (potential and actual), skew, and kurtosis for all of the study variables prior to log transformation: demographic variables (i.e., age, gender, and race), early adversity variables (e.g., physical abuse, neglect), early adversity composites (i.e., cumulative risk, threat, and deprivation), and psychopathology (i.e., internalizing and externalizing symptoms).

Seventy-four percent of participants reported at least one early adversity, such that 17% experienced one, 19% experienced two, 10% experienced three, and 28% experienced four or more early adversities. With regard to the prevalence of specific early adversities in the present sample, caregiver mental illness (41%) and caregiver substance abuse (41%) were the most common, followed by neglect (36%), emotional abuse (27%), witness to family violence (26%), physical abuse (22%), medical trauma (22%), sexual abuse (19%), witness to community violence (10%), and natural disaster (1%).

Bivariate Correlation Analyses. Bivariate correlation analyses were used to understand the relations among study variables. Considering that the majority of associations were significant ($p < .001$), only small ($.10 \leq r \leq .29$), medium ($.30 \leq r \leq .49$), and large ($r \geq .50$) effects will be interpreted (Cohen, 1988).

First, Bivariate Pearson correlations were conducted to understand the relation between demographic variables and early adversities (Table 2). Relations with small effect sizes included the association between sexual abuse and female gender ($r = -.23$), witness to community violence and nonwhite race ($r = .11$), and neglect and younger age ($r = -.11$). Caregiver

substance abuse was related to female gender ($r = -.10$) and white race ($r = -.16$), which were small effects, and younger age ($r = -.39$), which was a medium effect. In the same pattern, caregiver mental illness was related to white race ($r = -.13$) and younger age ($r = -.27$), which were small effects.

Second, Bivariate Pearson correlations were conducted to understand the relation between psychopathology and early adversities (Table 2). Physical abuse ($r = .25$), sexual abuse ($r = .26$), medical trauma ($r = .19$), witness to family violence ($r = .19$), witness to community violence ($r = .17$), and neglect ($r = .21$) were positively related to internalizing symptoms with a small effect, and emotional abuse ($r = .31$) was positively related to internalizing symptoms with a medium effect. Caregiver substance abuse was negatively related to internalizing symptoms with a small effect ($r = -.11$). Physical abuse ($r = .13$), sexual abuse ($r = .15$), witness to community violence ($r = .17$), and emotional abuse ($r = .10$) were positively related to externalizing symptoms with a small effect. Caregiver mental illness was negatively related to externalizing symptoms with a small effect ($r = -.23$), and caregiver substance abuse was negatively related to externalizing symptoms with a medium effect ($r = -.34$).

Third, Bivariate Pearson correlations examined the relation between the demographic variables and psychopathology (Table 3). There was a medium positive association between age and internalizing symptoms ($r = .31$) and a large positive relation between age and externalizing symptoms ($r = .58$). In addition, there was a small positive association between male gender ($r = .22$) and nonwhite race ($r = .14$) and externalizing symptoms.

Finally, Bivariate Pearson correlations were conducted to understand relations between the early adversity composites and psychopathology (Table 3). There was a small positive relation between the cumulative risk composite and internalizing symptoms ($r = .24$), and there

was a small negative relation between the cumulative risk composite and externalizing symptoms ($r = -.13$). There was a medium positive association between threat and internalizing symptoms ($r = .35$) and a small positive association between threat and externalizing symptoms ($r = .13$). There was a small positive association between deprivation and internalizing symptoms ($r = .13$) and, unexpectedly, a small negative association between deprivation and externalizing symptoms ($r = -.23$).

Linear Regression Analyses. Two sets of linear regressions were conducted to compare the predictive ability of the cumulative risk model and DMAP as they relate to internalizing symptoms (Table 4) and externalizing symptoms (Table 5). All analyses were conducted in two blocks, with age, gender, and race in the first block and the appropriate early adversity composite(s) added in the second block.

In the two internalizing models, age ($\beta = .33, p < .001$), gender ($\beta = -.07, p < .001$), and race ($\beta = -.10, p < .001$) were significant predictors of internalizing symptoms in the first block. Overall, the cumulative risk model was significant, $F(4, 26395) = 1711.52, p < .001$, adjusted $R^2 = .21$. In the second block, age ($\beta = .40, p < .001$), gender ($\beta = -.03, p < .001$), race ($\beta = -.07, p < .001$), and cumulative risk ($\beta = .32, p < .001$) significantly predicted internalizing symptoms. In a separate regression model, the DMAP model was significant, $F(5, 26394) = 1611.78, p < .001$, adjusted $R^2 = .23$. In the second block, age ($\beta = .34, p < .001$), gender ($\beta = -.03, p < .001$), race ($\beta = -.08, p < .001$), threat ($\beta = .31, p < .001$), and deprivation ($\beta = .07, p < .001$) significantly predicted internalizing symptoms.

In the two externalizing models, age ($\beta = .56, p < .001$), gender ($\beta = .16, p < .001$), and race ($\beta = .09, p < .001$) were significant predictors of externalizing symptoms in the first block. Overall, the cumulative risk model was significant, $F(4, 26395) = 3979.67, p < .001$, adjusted R^2

$\beta = .38$. Age ($\beta = .57, p < .001$), gender ($\beta = .16, p < .001$), race ($\beta = .09, p < .001$), and cumulative risk ($\beta = .04, p < .001$) were significant predictors of externalizing symptoms. The DMAP model was also significant, $F(5, 26394) = 3646.31, p < .001$, adjusted $R^2 = .41$. Age ($\beta = .52, p < .001$), gender ($\beta = .17, p < .001$), race ($\beta = .07, p < .001$), threat ($\beta = .21, p < .001$), and deprivation ($\beta = -.13, p < .001$) were significant predictors of externalizing symptoms.

DISCUSSION

The strong and pervasive effect of early adverse experiences on later psychopathology is a major public health concern. To advance research in this field, the present study compared two models for operationalizing early adversity, the cumulative risk model and DMAP, to predict psychopathology in a large sample of children referred to DCS in a southeastern state. More was learned about how early adverse experiences relate to psychopathology by separating adversities into categories of threat and deprivation than by aggregating them into a cumulative risk score.

First, I examined the impact of early adversities on internalizing symptoms in the cumulative risk model and DMAP. Consistent with hypotheses 1 and 2 of Study 2, both higher cumulative risk scores and higher threat scores predicted more internalizing symptoms. Although not hypothesized, the relation between deprivation and internalizing symptoms was also significant, such that higher deprivation scores predicted more internalizing symptoms. Squared semi-partial correlations suggest that 9% of the variance in internalizing symptoms was accounted for by early adverse experiences in the cumulative risk model. When examining the DMAP model, threat events accounted for 8% of the variance in internalizing symptoms whereas deprivation accounted for only 0.4%. Accordingly, the 9% of variance in internalizing symptoms accounted for by early adversity as measured by cumulative risk was almost entirely due to

threat events. In support of hypothesis 3 of Study 2, DMAP explained more of the variance in internalizing symptoms than the cumulative risk model.

Second, I examined the impact of early adversities on externalizing symptoms in the cumulative risk model and DMAP. Consistent with hypothesis 1 of Study 2, higher cumulative risk scores predicted more externalizing symptoms. Hypothesis 2 of Study 2 was partially supported; higher threat scores predicted more externalizing symptoms. However, contrary to the expected positive relation between deprivation and externalizing symptoms, higher deprivation scores predicted fewer externalizing symptoms. In examining the cumulative risk model in isolation, it appears as though early adversities have a negligible impact on externalizing symptoms, accounting for only 0.2% of the variance. Upon introducing the DMAP model, it becomes clear that threat events and deprivation events relate to externalizing symptoms in opposite directions, such that threat events are associated with more externalizing symptoms and deprivation events are associated with fewer externalizing symptoms. In support of hypothesis 3 of Study 2, DMAP explained more of the variance in externalizing symptoms than the cumulative risk model.

Consistent with Miller et al. (2018), threat events were positively associated with both internalizing and externalizing symptoms. Although Miller et al. (2018) found no relation between deprivation and internalizing symptoms and an indirect relation between deprivation and externalizing symptoms through deficits in verbal abilities, in the current research, deprivation events were positively associated with internalizing symptoms and negatively associated with externalizing symptoms. The current study's large sample size allowed for detection of the small magnitude, positive relation between deprivation and internalizing symptoms; however, it is unclear why deprivation events were associated fewer externalizing

problems in the current study. As exemplified in Miller et al. (2018), certain constructs (e.g., verbal abilities) may partially or fully mediate the relation between deprivation and externalizing symptoms. In addition, previous research has found that the developmental timing of deprivation is important in determining its relation with psychopathology. For example, Gunnar and Van Dulmen (2007) found early institutional rearing to be related to internalizing and externalizing symptoms only in children who were adopted at or after 24 months of age. As such, future research should seek to replicate the current findings, examining mediators of the relation between threat and deprivation and psychopathology and including variables assessing developmental timing of early adversity (Jaffee, 2017).

Notwithstanding notable strengths, including conducting one of the first empirical classifications of DMAP using a variety of early adversities in a large sample of children and adolescents, the current study has several limitations. First, data on early adversities such as parental criminal behavior, loss of loved ones, and parental divorce were not included, and so the adversities analyzed were not representative of all of the experiences children might face during development. However, research suggests that the maladaptive effects of divorce are, in part, attributed to parental discord (Amato & Sobolewski, 2001), and exposure to extreme levels of discord may be captured in the witness to family violence item. Second, despite including an estimate of early adversity severity, data on timing were unavailable. Child age at the onset and offset of early adverse experiences have important implications for the development of psychopathology (Thornberry, Ireland, & Smith, 2001). Third, in the current study, the CANS data were used cross-sectionally. There is ample evidence that early adversities predict psychopathology later in life, but cross-sectional methods preclude causal inference about these relations in the present research. Finally, the current research may under- and overrepresent early

adversities in children and adolescents. Participants missing data on caregiver mental illness and substance abuse received “0” for these items. As such, the number of children in the sample with exposure to caregiver mental illness and substance abuse was likely underestimated and analyses involving the cumulative risk and deprivation composites represent a conservative approach. In addition, sampling strategies have different implications for study findings. Due to higher instances of comorbidities in clinical populations, greater specificity may exist between stressors and outcomes in community-based samples (McMahon et al., 2003). Moreover, research suggests unique relations between psychopathology and prospective and retrospective reports of early adversities. While some research suggests a positive relation between CPS involvement and psychopathology (Bernard, Zwerling, & Dozier, 2015), other studies have found the impact of early adversities on psychopathology to be stronger and longer-lasting when assessed by retrospective report (Cohen, Brown, & Smailes, 2001). Unreported adversities could ultimately be more harmful, as they may continue or escalate without intervention (Kendall-Tackett & Becker-Blease, 2004). As such, the current research should be replicated, both with unique samples and integrating multiple methods for assessing early adversities in children into study designs. In the current study, the generalization of findings should be limited to children in state custody.

CONCLUSION

Early adverse experiences are not homogeneous in the risk that they confer for psychopathology, and deconstructing adversities into threat and deprivation events through DMAP provides insight into the influence of early adversity on psychopathology that is more nuanced than the cumulative risk model is able to offer. In addition to empirically deriving and validating the DMAP model, results suggest that individuals experiencing threat events may be

at the highest risk for developing psychopathological symptoms, and so they may benefit from selective interventions to prevent psychopathology. Future research should examine other developmental correlates of DMAP to better understand intervention targets for children exposed to deprivation events.

Appendix

Table 1
Descriptive Statistics

Measure	<i>M</i>	<i>SD</i>	Range			
			Potential	Actual	Skew	
Age	12.93	4.12	[5,18]	[5,18]	-.61	-1.04
Gender	.58	.49	[0,1]	[0,1]	-.32	-1.90
Race	.32	.47	[0,1]	[0,1]	.77	-1.40
Cumulative risk ^a	3.48	3.36	[0,30]	[0,25]	1.04	.89
Threat ^a	1.16	1.73	[0,18]	[0,16]	1.71	3.19
Physical abuse	.29	.61	[0,3]	[0,3]	2.08	3.74
Sexual abuse	.28	.63	[0,3]	[0,3]	2.37	5.03
Medical trauma	.08	.35	[0,3]	[0,3]	5.41	32.31
Natural disaster	.02	.17	[0,3]	[0,3]	11.78	157.47
Witness family violence	.38	.70	[0,3]	[0,3]	1.82	2.47
Witness community violence	.12	.41	[0,3]	[0,3]	3.85	16.67
Deprivation	2.31	2.25	[0,12]	[0,12]	.87	.21
Neglect	.53	.79	[0,3]	[0,3]	1.34	.85
Emotional abuse	.37	.68	[0,3]	[0,3]	1.84	2.78
Caregiver substance abuse	.78	1.07	[0,3]	[0,3]	.99	-.52
Caregiver mental illness	.63	.87	[0,3]	[0,3]	1.08	-.02
Internalizing ^a	2.08	2.27	[0,18]	[0,17]	1.19	1.06
Externalizing	5.94	5.81	[0,36]	[0,30]	.68	-.62

Note. ^astatistic prior to log transformation

Female = 0, male = 1; white = 0, nonwhite = 1.

Table 2
Bivariate Correlations with Individual ACEs

Measure	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1. Age														
2. Gender	.11***													
3. Race	.09***	.05***†												
4. PA	.02**	-.04***	-.01											
5. SA	.06***	-.23***	-.06***	.35***										
6. MT	.02*	-.01	-.01	.17***	.12***									
7. ND	.01	-.001	.003	.06***	.04***	.08***								
8. WVF	-.08***	-.05***	-.04***	.50***	.25***	.14***	.06***							
9. WCV	.08***	.03***	.11***	.22***	.13***	.15***	.11***	.35***						
10. Neglect	-.11***	-.08***	-.04***	.43***	.32***	.19***	.07***	.48***	.25***					
11. EA	.04***	-.09***	-.08***	.59***	.39***	.19***	.07***	.52***	.25***	.54***				
12. CSA	-.35***	-.10***	-.16***	-.02**	-.06***	-.01	.01	.10***	.01	.15***	.02***			
13. CMI	-.27***	-.09***	-.13***	.10***	.05***	.03***	.01*	.18***	.02***	.19***	.15***	.47***		
14. Intern	.31***	-.04***	-.07*** ^a	.25***	.26***	.19***	.04***	.19***	.17***	.21***	.31***	-.12***	.05***	
15. Extern	.58***	.22***	.14*** ^a	.10***	.12***	.06***	.02***	.02**	.18***	-.03***	.09***	-.34***	-.23***	.42***

Note. Pearson coefficients. †Phi coefficient.

PA = physical abuse; SA = sexual abuse; MT = medical trauma; ND = natural disaster; WVF = witness to family violence; WCV = witness to community violence; EA = emotional abuse; CSA = caregiver substance abuse; CMI = caregiver mental illness; intern = internalizing; extern = externalizing.

Female = 0, male = 1; white = 0, nonwhite = 1.

p* < .05. *p* < .01. ****p* < .001.

Table 3
Bivariate Correlations with ACEs Composites

Measure	1	2	3	4	5	6	7
1. Age							
2. Gender	.11***						
3. Race	.09***	.05***†					
4. Cumulative risk	-.24***	-.17***	-.13***				
5. Threat	.01	-.12***	-.02**	.73***			
6. Deprivation	-.29***	-.14***	-.16***	.86***	.44***		
7. Internalizing	.31***	-.04***	-.07***	.24***	.35***	.13***	
8. Externalizing	.58***	.22***	.14***	-.13***	.13***	-.23***	.42***

Note. Pearson coefficients. †Phi coefficient.

** $p < .01$. *** $p < .001$.

Table 4
Cumulative Risk and DMAP Predicting Internalizing Symptoms

Predictor	Cumulative Risk				DMAP			
	β	<i>t</i>	sr^2	ΔR^2	β	<i>t</i>	sr^2	ΔR^2
Step 1				.11***				.11***
Age	.33	56.28***	.11		.33	56.28***	.11	
Gender	-.07	-12.59***	.005		-.07	-12.59***	.005	
Race	-.10	-16.86***	.01		-.10	-16.86***	.01	
Step 2				.09***				.12***
Age	.40	70.10***	.15		.34	59.49***	.10	
Gender	-.03	-5.10***	.001		-.03	-4.89***	.001	
Race	-.07	-11.95***	.004		-.08	-15.20***	.007	
Cumulative risk	.32	55.50***	.09					
Threat					.31	51.24***	.08	
Deprivation					.07	11.43***	.004	

*** $p < .001$.

Table 5
Cumulative Risk and DMAP Predicting Externalizing Symptoms

Predictor	Cumulative Risk				DMAP			
	β	<i>t</i>	sr^2	ΔR^2	β	<i>t</i>	sr^2	ΔR^2
Step 1				.38***				.38***
Age	.56	113.99***	.31		.56	113.99***	.31	
Gender	.16	32.12***	.02		.16	32.12***	.02	
Race	.09	17.95***	.008		.09	17.95***	.008	
Step 2				.002***				.03***
Age	.57	113.18***	.30		.52	103.00***	.24	
Gender	.16	33.00***	.03		.17	35.28***	.03	
Race	.09	18.73***	.008		.07	15.21***	.005	
Cumulative risk	.04	8.17***	.002					
Threat					.21	38.34***	.03	
Deprivation					-.13	-23.37***	.01	

*** $p < .001$.

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