ABSTRACT

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Adverse childhood experiences (ACEs) are consistently associated with negative developmental and behavioral outcomes in adolescence and adulthood, including increased engagement in internalizing (e.g., withdrawn, nervous, irritable, and sadness) and externalizing problem behaviors (e.g., aggression, rule breaking, and risk-taking behaviors). The impact of ACEs on later outcomes is influenced by the context of the child's family, especially parental functioning. Parenting stress affects a primary caregiver's parenting behavior and the quality of the caregiving, and increased levels of parenting stress are associated with increased child behavior problems. This study investigated the extent to which ACEs by age five were related to changes in internalizing and externalizing problem behaviors over a 10-year span of time, and whether parenting stress moderated the relationship between ACEs and changes in problem behaviors over time. Results indicated that problem behaviors significantly increased as the number of ACEs increased, suggesting that childhood adversity exerts a significant effect on behavior over time. Change in parenting stress did not exert a significant effect on the relationship between ACEs and the development of internalizing and externalizing problem behaviors over time.

A Longitudinal Analysis of the Effects of Adverse Childhood Experiences on Internalizing and Externalizing Behaviors in Adolescence

by
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DEDICATION

This dissertation is dedicated to my wonderful mother, Patrice Codd. Without her, I would never have believed a Ph.D was within reach. Thank you for being my trailblazer, cheerleader, and shoulder to cry on. This journey would not have been possible without your constant love and support. Thank you also to my dad, Nick Codd. Whenever I hit a rough patch, I can always hear you cheering me on, “Rock on, Evie Lou!” Thank you to my sister, who never failed to shower me with flowers, pizza, and phone calls when I met a milestone. I’m so lucky to have you as a sister, you make my life better in so many ways. Finally, thank you to my husband, Steven, who has witnessed almost every leg of this journey firsthand. You were the calm presence that helped me weather all of the storms. Thank you for your constant patience and love, and thank you for following me on this wild endeavour.

BIOGRAPHY

Evadine L Codd is a doctoral student of school psychology at North Carolina State University. Her research interests focus on barriers to academic achievement in underrepresented and underserved populations. Evadine is currently conducting research examining the influence of family functioning on emotional and behavioral outcomes of adolescents with histories of adverse childhood experiences

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INTRODUCTION

Adverse childhood experiences (ACEs) are consistently associated with developmental, behavioral, and physical health problems in adolescence and adulthood, and as a child's exposure to ACEs increases, so too does their risk for later maladaptive outcomes (Balistreri et al., 2015; Burke et al., 2011; Hunt et al, 2017). ACEs include both harmful events, such as child maltreatment, and adverse socio-environmental influences, such as neglect or familial factors, that are associated with potential trauma or chronic stress in children. ACEs are generally comprised of nine categories, including physical, emotional, and sexual abuse, alcohol or drug abuse in the household, an incarcerated household member, a chronically mentally ill household member, a mother treated violently, parental separation, and emotional or physical neglect (Burke et al., 2011; Felitti et al., 1998).

Previously, much of the research on ACEs have used retrospective reports of ACEs to examine adult outcomes (e.g., Bellis et al., 2018; Felitti et al., 1998; Hillis et al., 2001). As interest in ACEs continue to grow, attention has turned to examining how cumulative adversity impacts adolescent health and wellbeing and the development of internalizing and externalizing problem behaviors (e.g., Burke et al., 2011; Cromer et al., 2017; Kerker et al., 2015). Adversity does not occur in isolation, and it is important to examine how later outcomes may be influenced by the context of the child's family, especially parental functioning. Positive parent-child communication and lower levels of parent stress may buffer against the negative effects of ACEs. While there is extensive research on parenting stress as a risk factor for child maltreatment (Barnhart & Maguire-Jack, 2016; Holden et al., 1989; Rodriguez & Green, 1997; Rodriguez & Richardson, 2007; Stith et al., 2009), very few studies examine the trajectories of parenting stress throughout child development or examine how parenting stress influences the development of child problem behaviors post-maltreatment. Examining these relationships through a longitudinal lens, rather than a retrospective lens, provides a unique insight into the development and course of adolescent internalizing and externalizing problem behaviors among children with a history of adversity.

Using a cumulative risk approach, this study examined the impact of ACEs on the change from child to adolescent emotional and behavioral wellbeing and investigated how parent stress potentially moderated this relationship among a sample of socially, racially, and economically diverse families. To fulfill the goals of this study, there were four interrelated objectives: (a) To determine the extent that parenting stress changes over time, (b) to examine the extent to which ACEs by age five are related to changes in internalizing and externalizing problem behaviors over a 10-year span of time, (c) to examine whether parenting stress moderates the relationship between ACEs and the change in internalizing and externalizing problem behavior over time, and (d) to examine whether problem behaviors moderate the effects of ACEs on parenting stress. Figure 1 illustrates the relationships this study examines.

ACE Exposure and Health Outcomes

ACEs pose a significant public health concern with more than 3.5 million cases of child maltreatment or neglect reported to Child Protected Services (CPS) every year (US Department of Health and Human Services, 2019). Nearly half of all children in the United States (US) are exposed to one ACE, and 22% of children experience at least two ACEs (Balistreri et al., 2015). Although ACEs occur across all demographic and socioeconomic statuses (SES), differences exist in the risk of experiencing adversity according to subgroups of samples from the population. For example, the percentage of children exposed to at least one ACE jumps to 70% when considering urban populations, economically disadvantaged families, and those with mothers of limited education attainment (Hunt et al., 2017). Furthermore, Latinx and Black children are more likely to experience disproportionately high rates of maltreatment.

A wealth of research has linked childhood adversity to a wide range of mental and physical health problems in adolescence and adulthood. In a study of 3,000 children, Hunt et al. (2017) found that children exposed to three or more ACEs are more likely to display clinically significant internalizing and externalizing problem behaviors, including engaging in aggressive behavior and rule breaking, feeling anxious or depressed, withdrawing from activities, and expressing somatic complaints. Furthermore, due to the cumulative nature of adversity, as a child's exposure to ACEs increases, so too does their likelihood of poor outcomes. In one study among a large population-based sample, Balistreri et al. (2015) found that for every ACE a child is exposed to, the odds of internalizing behavior problems increase by 32% in adolescence (OR = 1.32; $p < 0.001$). In a similar study, Hunt et al. (2017) found that in comparison to children with 0 ACEs, those with 2, 3 or 4 ACEs had 1.7 ($p < .01$), 1.8 ($p < .01$), and 2.7 ($p < .01$) times the odds of receiving an Attention Deficit/Hyperactivity (ADHD) diagnosis, respectively (American Psychiatric Association, 2013).

In a review of the long-term effects of ACEs and childhood toxic stress, Shonkoff and Garner (2012) found that throughout adolescence and into early adulthood, exposure to ACEs increases the likelihood of using alcohol or drugs as a means or coping, engaging in risk-taking behaviors, such as unprotected sex, and having difficulty maintaining healthy relationships. Through direct and indirect pathways, exposure to ACEs may decrease adolescents' quality of life, especially in the domains of physical and emotional wellbeing and friendships (Greger et al., 2017).

The increase of internalizing and externalizing problem behaviors in adolescence due to previous victimization may be explained by disruptions in developmental processes due to repetitive, traumatic events (Cromer et al., 2017). According to some complex trauma theories, the experience of chronic or toxic levels of stress during childhood development may initiate a cascading sequence of changes in emotional, cognitive, and physiological regulatory processes, which may then present as complex and severe psychopathology.

The experience of intense, aversive environmental stressors during childhood is associated with changes in key biological systems, resulting in a dysregulated stress response including hypervigilance to perceived threats (Lupien et al., 2009). This dysregulation is associated with difficulty integrating physical sensations, emotions, and cognitions, all of which lead to disorganized methods of coping with stress and regulating behavior (Cromer et al., 2017; Kearney et al., 2010; Shonkoff & Garner, 2012). Cromer et al. (2017) found that childhood post-traumatic stress significantly contributed to adolescent symptoms of major depressive disorder (MDD; indirect effect = .13, $p < .05$), generalized anxiety disorder (GAD; indirect effect = .11, $p < .05$), ADHD (indirect effect = .19, $p < .05$), oppositional defiant disorder (ODD; indirect effect = .13, $p < .05$), and conduct disorder (CD; indirect effect = .11, $p < .05$) (American Psychiatric Association, 2013).

Reactions to trauma among children and adolescents are diverse and varied, and often result in impairments across multiple domains of development, including emotional and behavioral dysregulation. This in turn increases the likelihood of aggression and impulsivity, maladaptive cognitive processes and the development of low self-concept, which are associated with depression and anxiety, and a dysregulated stress response leading hypervigilance to perceived threats (Cromer et al., 2017; Shields et al., 1998; Teague, 2013). Children who are exposed to chronic stress often display negative explanatory styles and cognitive distortions, further increasing the chances of developing clinically significant internalizing problem behaviors (Kearney et al. 2010).

Impact of Parenting Stress

Adversity and the development of problem behaviors do not occur in a vacuum. It is important to examine the effects of interpersonal risk factors, such as parenting stress, on the development of emotional and behavioral problems throughout childhood and adolescence. Within the field of ACEs research, parenting stress is not typically viewed as a moderating variable; however, parenting stress directly impacts a primary caregiver's parenting behavior, the quality of the caregiving, and the stability of the family environment (Crouch et al. 2019). As such, parenting stress may significantly influence the relationship between ACEs and the development of problem behaviors over time.

For the purposes of this study, parenting stress is defined as the cumulative exposure of day-to-day child-rearing stressors that "exert pressure in the form of losses on parents – for example, loss of time, energy, and control over one's self and life" (Rodriguez-JenKins & Marcenko, 2014, p. 20). Thus, when parental responsibilities outweigh the resources available to the parent, parenting stress increases (Barnhart et al., 2016; Deater-Deckard, 1998).

Parenting stress is associated with several changes in the parent-child dyad that may have important implications on adolescents' development of internalizing and externalizing problem behaviors, and for children exposed to ACEs, parenting stress may have even greater detrimental effects (Abidin, 1990; Morgan et al., 2002; Neece et al., 2012). High levels of parenting stress increase the likelihood of harsh and punitive discipline practices, which may increase the negative effects of ACEs on a child (Pinderhughes et al., 2000). Additionally, less sensitive caregiving due to aggravation in parenting undermines a supportive parent-child relationship that serves as an important protective factor for childhood adversity (Sciaraffa et al., 2018). Thus, the way a caregiver manages parenting stress after a child experiences adversity has the potential to influence child behavior outcomes. For example, caregivers with low levels of parenting stress are not only more responsive to their child's needs but may act as a model for how to effectively cope with intense negative emotions resulting from adversity (Bethell et al., 2017; Maughan & Cicchetti, 2002). Data from the Avon Longitudinal Study of Parents and Children suggest that lower levels of maternal stress and higher levels of positive feelings about parenting abilities are associated with resilience in the face of early childhood adversity (Savage-McGlynn et al., 2015). Additionally, in a study examining the effects of domestic violence on childhood behavioral outcomes, maternal parenting stress had a significant direct effect on children's adjustment, above and beyond the effects of domestic violence, suggesting that children of caregivers who are less aggravated in parenting have decreased negative emotional and behavioral outcomes (Levendosky & Graham-Bermann, 1998). Finally, Asok et al. (2013) found that parental responsiveness and sensitivity decreased the adverse physiological effects of early childhood adversity.

Parenting stress is a complex construct resulting from interactions between individuals and the environment (Neece et al., 2012). Parenting stress is bidirectional and reciprocal in relation to the parent-child relationship, in that high levels of parenting stress are associated with increased child problem behaviors, and reciprocally, heightened child problem behaviors lead to increased parenting stress (Abidin, 1990; Neece et al., 2012). Given this transactional model of parenting stress, it is clear that how well a caregiver manages parenting stress can be seen as both a trigger and an outcome of child behavior problems: Child behavior problems are positively associated with parenting stress, and caregivers experiencing high levels of parenting stress are less sensitive to the needs of the child, which may then lead to an escalation in child behavior problems (Neece et al., 2012; Pereira et al., 2012). In an investigation of the transactional model of parenting stress and child problem behaviors, Mackler et al. (2015) found there was a direct effect of parenting stress on child externalizing problem behaviors over time, in that parenting stress predicted a significant increase in children's problem behaviors over a 5-year time period. Furthermore, children's problem behaviors at ages 4, 5, and 7 were positively associated with later parenting stress at ages 5, 7, and 10.

While there are many studies examining the influence of parental warmth and sensitivity on child maltreatment outcomes, few studies have examined how changes in parenting stress levels moderate the relationship between ACEs and adverse adolescent outcomes, such as internalizing and externalizing problem behaviors.

The Current Study

This study investigated the effects of ACEs accumulated by age five on the longitudinal development of adolescent internalizing and externalizing problem behaviors. In addition, this study examined the moderating effects of parenting stress on the relationship between ACEs and adolescent internalizing and externalizing problem behaviors over time, and the moderating effects of internalizing and externalizing problem behaviors on parenting stress.

This study sought to answer five research questions. The research questions and hypotheses are:

1. How does parenting stress and child internalizing and externalizing problem behaviors change throughout childhood?

a. It was hypothesized that parenting stress would remain relatively high and stable throughout childhood based on previous evidence for the relative stability of maternal parenting stress during adolescence (Putnick et al., 2010; Seginer et al., 2002).

b. It was hypothesized that childhood internalizing and externalizing problem behaviors would increase throughout childhood based on previous studies (Mathiesen et al., 2009).

2. Does exposure to ACEs in childhood increase an adolescent's change of internalizing and externalizing problem behaviors? A growth curve analysis was used to assess the change in youth problem behaviors over time.

    a. It was hypothesized that there would be a significant positive relationship between number of ACEs and change in internalizing and externalizing problem behaviors over time, such that children with higher ACE scores would show an increase in maladaptive behaviors over time. This is supported by evidence from similar studies examining mental health outcomes of children exposed to ACEs (Balistreri et al., 2015; Cromer et al., 2017; Hunt et al., 2017).

3. Does change in parenting stress increase the change of problem behaviors over time? A growth curve analysis was used to assess the change in child problem behaviors over time.

    a. It was hypothesized that there would be a significant positive relationship between amount of parenting stress and problem behaviors, such that an increase in parenting stress would show an increase in the amount of problem behaviors children engage in over time. This hypothesis is based on a number of studies exploring the effects of parenting stress, dysfunctional parenting, and child misbehavior (Review study, Morgan et al., 2002).

4. Does parenting stress moderate the relationship between ACEs and the change in internalizing and externalizing problem behaviors over time? The moderation of parenting stress with ACEs was assessed for its effect on the change of slopes in children's problem behaviors.
    a. It was hypothesized that parenting stress would moderate the relationship between ACEs and adolescents' internalizing and externalizing problem behaviors, such that an increase in parenting stress over time would moderate the effects of ACEs on the change in adolescents' internalizing and externalizing problem behaviors over time.
5. To more fully understand the relationship between parenting stress and internalizing and externalizing problem behaviors, an exploratory research question investigated whether problem behaviors moderate the relationship between ACEs and parenting stress.
    a. Given previous work on the reciprocal relationship between parenting stress and problem behaviors, it was hypothesized that child problem behaviors would moderate the relationship between ACEs and parenting stress, such that the interaction of increased number of ACEs with increased problem behaviors would result in increased parenting stress (Morgan et al., 2002).

METHODS

Data Source

This study used data from the Fragile Families and Child Wellbeing Study (FFCWS) sponsored by Princeton and Columbia Universities. FFCWS is a nationally representative longitudinal study of nearly 5,000 children born in the US between 1998 and 2000. The sample was selected using a complex sample design in order to oversample for certain characteristics. The sample cities were, collectively, nationally representative with large variations in policy regimes and labor market conditions. Sampling occurred in three stages: selection of sample cities, sampled hospitals, and sampled births. The baseline data were largely collected in hospital settings immediately following child delivery. Most of these children were born to unmarried parents (i.e., 3600 non-marital- and 1100 marital births) and were at greater risk of living in poverty. Families were excluded from the study if the parents planned to place the child in an agency for adoption, if the father of the baby was deceased, and if the mothers or their babies were too ill to complete the interview (Reichman et al., 2001). The follow-up data was collected at child ages one, three, five, nine, and 15. For the purposes of this study, only data collected at ages three, five, nine, and 15 were used. Any families who did not participate in data collection at ages three and five when ACE data were collected were excluded from the analyses. Table 1 provides information on child race/ethnicity and ACE data.

Measures

Dependent Variables. Internalizing and externalizing problem behaviors were assessed using subscales from the Child Behavior Checklist (CBCL; Achenbach & Rescorla, 2001). The FFCWS dataset included all the items from the anxious/depressed and withdrawn subscales of the Internalizing Problems Composite Scale on the CBCL (15 items, $\alpha = .75$, FFCWS, 2019). Similarly, the FFCWS dataset included items from the aggressive behavior and delinquent subscales of the Externalizing Problems Composite Scale on the CBCL (23 items, $\alpha = .86$, FFCWS, 2019). At child ages five, nine, and 15, each primary caregiver was asked to rate behaviors as *not true* (0), *somewhat true* (1), and *very true* (2). The average raw score was calculated for each scale and used in the growth curve analyses. Table 2 provides descriptive characteristics of the CBCL data.

Independent Variable. ACEs were assessed at ages three and five using primary caregiver reports of abuse or neglect. Data on seven ACE categories were collected: Childhood abuse (i.e., emotional and physical), neglect, parental domestic violence, maternal anxiety or depression, maternal substance abuse, and paternal incarceration. Data on the additional two ACE categories, parental separation and sexual abuse, were not available, and were not included in this study. Each of the seven ACE categories were coded into dichotomous variables indicating whether the experience occurred (1) or did not occur (0). A total ACE score was calculated by adding the scores from each of the seven dichotomous ACE variables.

Data on abuse and neglect were collected using subscales from the Parent-Child Conflict Tactic Scale (CTS-PC; Straus et al., 1998). CTS-PC data from the FFCWS were coded in an ordinal scale (e.g., an incident occurred none, once, twice, 3-5 times, 6-10 times, 11-20 times, and 21+ times). Each abuse and neglect variable were recoded using the midpoint of incidents in a category (i.e., one incident =1, two incidents =2, 3-5 incidents = 4, 6-10 incidents = 8, 11-20 incidents = 15, and 21+ incidents = 25). Each item was then summed, and the totals were transformed into a dichotomous variable indicating whether a child scored in the top 10 percentile for the total number of abuse or neglect incidents. For the abuse and neglect ACE variable, children with scores in the top 10 percent were coded as "1," indicating that substantial abuse occurred, and children without scores in the top 10 percent were coded as "0."

Parental domestic abuse was assessed by maternal report on physical (2 items), emotional (3 items), and sexual violence (1 item). Items included "How often does he slap or kick you?" "How often does he try to prevent you from going to work or school?" and "how often does he try to make you have sex or do sexual things you don't want?" Responses for each item were 0 = never, 1 = sometimes, and 2 = often. These variables were added together and recoded into one dichotomous variable. If a mother reported "never" on all six items, then parental domestic abuse was coded as "0," indicating that domestic abuse did not occur. If a mother reported "Sometimes" or "Often" on any of the six items, the domestic abuse ACE variable was coded as "1," indicating that domestic abuse occurred.

Maternal anxiety or depression were assessed using a constructed dichotomous variable indicating whether the mother or father meets criteria for GAD or MDD. This variable was constructed by the FFCWS using the Composite International Diagnostic Interview- Short Form (CIDI-SF; Kessler et al., 1998), which uses 15 items to assess anxiety and 20 items to assess depression. CIDI-SF demonstrates good test-retest reliability and validity for anxiety and depression (Gigantesco & Morosini, 2008; Patten et al., 2000). This dichotomous variable classified parents as either "probable cases" or "probable non-cases" for MDD or GAD based on whether the mothers' responses met DSM-IV diagnostic criteria. If a mother endorsed all questions about having either anhedonia or dysphoric mood, she was coded as a "probable case" for MDD. If a mother endorsed an anxious period of at least six months, a lack of control of anxiety, and physiological symptoms, she was coded as a "probable case" for GAD (FFCWS, 2019). For the maternal anxiety and depression ACE variable, if a mother was classified as a "probable case" for either depression and/or anxiety, she was coded as "1," indicating that a child was exposed to parental symptoms of mental illness. If a mother was not classified as a "probable case" for either depression and/or anxiety, she was coded as "0," indicating that the child was not exposed to maternal mental illness.

Maternal substance abuse was assessed using 11 items from the CIDI-SF (Kessler et al., 1998) to create a single dichotomous indicator variable of a drug or alcohol problem. Items were based on criterion A of the DSM-III-R alcohol and drug dependence criteria. For the maternal substance abuse ACE variable, if a mother indicated she had a drug or alcohol problem, she was coded as “1,” indicating that substance abuse occurred. If a mother did not meet criteria for a drug or alcohol problem, she was coded as “0,” indicating that substance abuse did not occur.

Paternal incarceration was assessed using a single dichotomous variable indicating whether the father was currently or had recently been incarcerated. If the father was currently or had recently been incarcerated, the parental incarceration ACE variable was coded as “1,” and if there was no recent incarceration, the variable was coded as “0.”

Each of the seven dichotomous ACE variables collected, including abuse and neglect, witnessing domestic violence, parent anxiety or depression, parental substance abuse, and parental incarceration were added together to create a cumulative ACE measure indicating the total number of ACEs a child has been exposed to. See Table 2 for the characteristics of the ACE variables.

Moderating Variable. Parenting stress was assessed at every wave of data collection using a scale derived from the Child Development Supplement of the Panel Study of Income Dynamics. This four-item scale measures the amount of parenting stress brought on by changes in employment, income or other factors in the parent’s life, and several items come from the Parenting Stress Inventory (PSI; Abidin, 1995). The PSI demonstrates adequate convergent and predictive validity (Haskett et al., 2006) and reliability (α = .96; Abidin, 1995). Items are scored on a 4-point Likert scale to measure agreement with statements about parenting, such as, “I feel trapped by my responsibilities as a parent” and “I often feel tired, worn out, or exhausted from raising a family." Items were averaged to create a scale for parenting stress, and scores range from 4 to 16 (FFCWS, 2019). See Table 2 for the characteristics of the parenting stress variable.

RESULTS

Descriptive analyses, including means, standard deviations, skewness, and kurtosis for all variables were calculated. Regarding the experience of childhood adversity, over 44% of the sample had at least one ACE, 22% had at least two ACEs, and almost 16% of the sample had three or more ACEs. The average number of ACEs across this sample was 1.57 (SD 1.4). See Table 1 for further description of ACEs and other demographic information.

Due to the limited number of items for each CBCL composite scale, published T-scores were not available, and extrapolated T-scores yielded highly skewed scores that violated assumptions of normally distributed data so raw scores were used. Likewise, the parenting stress items were also a subset of the entire scale so raw scores were also used, although the average raw scores at five years of age still remained skewed. The partial parenting stress and CBCL internalizing and externalizing scales' average raw scores from five years of age to nine years of age to 15 years of age. Table 2 shows the descriptive statistics for the PSI and CBCL partial scales by years of age.

With each unconditional linear growth curve analysis of parenting stress, internalizing problem behaviors and externalizing problem behaviors, a residual file was produced that provided the y-intercept and slope coefficient for each case which was used to create a change in slope variable for the parenting stress, internalizing problem behavior and externalizing problem behavior partial scales across the three data collection points by age of the youth. Table 2 shows the descriptive statistics of the individual case slope variables.

Growth Curve Analysis of Parenting Stress, Internalizing and Externalizing Problems

Growth curve analyses were conducted to examine the trajectories of child internalizing and externalizing problem behaviors and parenting stress over time using hierarchical linear modeling (HLM; Raudenbush & Bryk, 2002). HLM was used to assess (a) whether there is a significant change in parenting stress over time, (b) whether there are significant differences in the levels and slopes of problem behaviors of children who have experienced varying levels of ACEs, (c) whether parenting stress moderates the effects of ACEs on child problem behaviors, and (d) whether child problem behaviors moderate the effects of ACEs on parenting stress.

To answer the first question examining changes in parenting stress over time, a growth curve analysis was used. In this model, parenting stress was the dependent variable (Y), and time was measured at time points 0 (child 5 years of age), 1 (child 9 years of age), and 2 (child 15 years of age). The Y intercept was centered at time point 0, and β_1 was the slope in parenting stress over time points 0, 1, and 2. The equation for this model is as follows:

$$Y = \beta_0 + \beta_1 * (TIME) + R$$

The results of fitting the unconditional growth model indicated that parenting stress increased across childhood and adolescence. The initial intercept for the average amount of parenting stress experienced when children were age five was 2.85, and the slope was .06, thus parenting stress increased to 2.91 when children were age nine, and 2.97 when children were age 15. The estimates for the initial intercept and slope of parenting stress were statistically significant. Results from this model were used to develop an independent (moderating) variable to answer the third research question, which was whether parenting stress moderated the effects of ACEs on child problem behaviors.

To answer the second research question examining the development of child problem behaviors over time, another growth curve analysis was used. This model was used to separately test the level and change in slopes for internalizing and externalizing problem behaviors. The results of fitting the unconditional growth model indicated that internalizing and externalizing problem behaviors increased across childhood and adolescence. The initial intercept for internalizing problem behaviors (the average score when children were aged five) was 0.4, and the slope (the average rate of change in internalizing problem behaviors over time) was 0.5, and both estimates were significantly different from zero. This means that by age nine, the average internalizing problem behaviors increased to 0.9, and by age 15, had increased to 1.4. For externalizing problem behaviors, the initial intercept was 0.53, with a slope of 0.42. Both estimates were significantly different from zero. The rate of change indicated that by age nine, the average externalizing problem behavior score increased to 0.95, and by age 15 had increased to 1.37.

See Table 3 for all the unconditional growth curve models of fixed effects of the parent stress, internalizing and externalizing problem behavior models. In addition to testing whether these variables increased over time, a residual data file with each cases' y-intercept and slope over time was produced for each of these variables and then entered into other growth curve models as a single variable of change in slope of parenting stress, internalizing and externalizing problem behavior. The descriptive statistics of the slopes in the variables are depicted in Table 2.

Main Effects of ACEs on Parenting Stress, Internalizing and Externalizing Problems

To examine the relationship between number of ACEs and the level and slope of internalizing and externalizing problem behaviors and parenting stress, a 2-level model was used to test these effects. The ACEs variable was treated as a dichotomous variable by category

(ACEs1 = 1 or 0, ACEs2 = 1 or 0, ACEs3 = 1 or 0) and the change in parenting stress, internalizing problem behavior and externalizing problem behavior at level 2. For this model, *G00* was random effects of the independent variables effect on β_0. *G10* through *G13* represent the effect of the number of ACEs measured as dichotomous variables on the slope (β_1) of the dependent measure and *G14* was the effect of parenting stress on the slope or change over *TIME* on the dependent measure analyzed. The equations for the main effects model are as follows:

$$Y = \beta 0 + \beta 1*(TIME) + R$$

$$\beta 0 = G00 + U0$$

$$\beta_1 = G10 + G11*(ACEs1) + G12*(ACEs2) + G13*(ACEs3) + G14*(PS) + U_1$$

Table 3 shows the main effects of the number of ACEs on internalizing and externalizing problem behaviors. For the internalizing problem behavior model, the results of the main effect model indicated that the number of ACEs analyzed as dichotomous variables for one ACE, two ACEs or three or more ACEs all significantly predicted changes in internalizing problem behavior over time, in that the more ACEs a child had, the greater the increase in internalizing problem behaviors over time. From the initial slope of 0.48 at age five, children with one ACE exhibited a 0.02 increase in the slope on their internalizing behavior scores on average, which was statistically significant. In order to determine the average internalizing problem behavior scores at ages nine and fifteen, the initial intercept of 0.4 was added to the initial slope of 0.48, which was then added to the main effects slope of 0.02 (0.4 + 0.48 + 0.02 = 0.9). This means that at age nine, children with one ACE have an average internalizing score of 0.9. To calculate the average internalizing problem behavior score at age nine, the initial score and main effects slope scores were added to the age nine score of 0.9 (0.9 + 0.48 + 0.02 = 1.4), which means that at age 15, children had an average internalizing problem behavior score of 1.4.

For children with two ACEs, there is an even greater increase in internalizing problem behaviors over time. From the initial time slope of 0.48, children with two ACEs showed a 0.03 increase in the slope of internalizing behaviors on average, which was statistically significant. As previously described, the initial internalizing slope of 0.48 was added to the main effects slope of 0.03, and then added to the initial intercept of 0.4 which equals an internalizing problem behaviors intercept of .91 at age nine (0.4 + 0.48 + 0.03 = 0.91). For age 15, the initial and main effects slopes were added to the age nine intercept of 0.91, leading to an intercept of 1.42 (0.91 + 0.48 + 0.03 = 1.42).

Children with three or more ACEs exhibit the greatest increase in slope of internalizing problem behaviors. From the initial slope of 0.48, children with three or more ACEs see an increase of 0.05 in slope of internalizing behaviors, which is statistically significant. To calculate the average at age nine, the initial slope of 0.48 was added to the main effects slope of 0.05 and then added to the initial intercept of 0.4 which equals an internalizing problem behaviors intercept of 0.93 at age 9. For age 15, the initial and main effects slopes were added to the age nine average of 0.93, leading to an intercept of 1.46 (0.93 + 0.48 + 0.05 = 1.46).

Surprisingly, slope in parenting stress had a statistically significant negative effect on the slope if internalizing problem behaviors such that parenting stress acted to reduce the steepness of the increase in child to adolescent internalizing problem behavior. At age nine, the intercept of .4 plus the average slope of .48 in internalizing problem behavior would show less of a steep trajectory by -.016 when change in parenting stress was considered (.4 + .48 - .016 = .86). At age 15, the decelerating effect on internalizing problem behavior would result in an average score of 1.32 (.86 + .48 - .016 = 1.32) Figure 2 demonstrates the effects of ACEs and parenting stress on internalizing problem behaviors over time.

For externalizing problem behaviors, the results of the main effect model demonstrate that number of ACEs significantly predicted an increase in externalizing problem behavior over time for children who had two or more ACEs, but not for children with one ACE. From the initial slope of 0.4, children with two ACEs exhibit a 0.03 increase in the slope of externalizing behaviors on average, which is statistically significant. As previously described, the initial externalizing slope of 0.4 was added to the main effects slope of 0.03, and then added to the initial intercept of 0.53 which equals an externalizing problem behaviors intercept of 0.96 at age nine (0.53 + 0.4 + 0.03 = 0.96). For age 15, the initial and main effects slopes were added to the age nine intercept of 0.96, leading to an intercept of 1.39 (0.96 + 0.4 +0.03 = 1.39).

Children with three or more ACEs exhibit the greatest increase in the slope of externalizing problem behaviors. From the initial slope of 0.4, children with three or more ACEs see an increase of 0.06 in slope of externalizing behaviors, which is statistically significant. To calculate the intercept at age nine, the initial slope of 0.4 was added to the main effects slope of 0.06 and then added to the initial intercept of 0.53 which equals an intercept of 0.99 (0.53 + 0.4 + 0.06 = 0.99). For age 15, the initial and main effects slopes were added to the age nine intercept of 0.99, leading to an intercept of 1.45 (0.99 + 0.4 + 0.06 = 1.45).

As with internalizing problem behavior, slope in parenting stress was also used to predict change in externalizing behavior over time. Again, it showed a statistically significant relationship and was negatively associated with the slope in externalizing problem behavior. At age nine, the intercept of .53 plus the slope of .40 was summed and the negative slope of parenting stress subtracted (.53 + .40 - .019 = 1.31). Figure 3 demonstrates the effects of ACEs and slope in parenting stress on externalizing problem behaviors over time.

An exploratory test of the effect of ACES and change in children's internalizing and externalizing problem behaviors on change in parenting stress was investigated. Growth curve analyses were also used to examine the effect of ACEs and change in internalizing and externalizing problem behaviors on parenting stress. Interestingly, results indicated that as the number of ACEs increased, the change in parenting stress significantly decelerated. For children with one ACE, parenting stress decreased in slope by .18 at each time point, so that for a child age nine, the parenting stress intercept was 3.5, and at age 15 it was 3.94. For children with two ACEs, the rate of growth in parenting stress slowed even further, with a slope of -.2. This means that at age nine, the parenting stress intercept was 3.48, and at age 15 it was 3.9. Children with three or more ACEs showed the most significant deceleration in parenting stress, with a slope of -.23, so that at age nine, the parenting stress intercept was 3.45, and for age 15 it was 3.84. Thus, ACEs exert a significant negative effect on parenting stress in that as the number of ACEs increase, parenting stress decreases. Although this research question was exploratory, the result was unexpected and contradictory to hypotheses, and potential reasons for this finding are explored in the Discussion section.

Moderating Effects of Parenting Stress and ACEs on Internalizing and Externalizing Problems

To answer the third research question examining the moderating effects of parenting stress on the relationship between ACEs and problem behaviors, another level-2 model was used. For this model, *G10* through *G14* remained the same from the previous research question. *G15* was equal to (ACEs1*PS), *G16* = (ACEs2*PS), *G17* = (ACEs3*PS). Table 3 and Figure 1 illustrate the moderating effects of parenting stress on the relationship between ACEs and internalizing and externalizing problem behaviors. Contrary to the hypothesis, parenting stress did not exert a significant effect on the slope or change of problem behaviors. With an initial average intercept of .4 and slope of .5 for internalizing problem behaviors, children with one ACE had a saw an increase of .02 in slope. Children with two or more ACEs had a .03 increase in slope. For externalizing problem behaviors, the initial intercept was .53 and the slope was .4. Among children with only one ACE, the slope of change in externalizing problem behaviors increased by .01. For children with two ACEs, the slope increased by .03, and for children with three or more ACEs, the slope increased by .06. There were no significant moderating effects of change in parent stress by ACE variables in the prediction of change in internalizing or externalizing problem behaviors over time.

To fully explore the interaction between parenting stress and problem behaviors, the moderating effects of internalizing and externalizing problem behaviors on the relationship between ACEs and parenting stress were examined using a level-2 model. The equation for this model is as follows:

$$Y = \beta 0 + \beta 1*(TIME) + R$$

$$\beta_0 = G00 + u_0$$

$$\beta_1 = G00 + G01*(ACEs1) + GO2*(ACEs2) + G03*(ACEs3) + G04*(SlopeExt)$$

$$G05*(ACEs1*Ext1) + GO6*(ACEs2*Ext2) + G073*(ACEs3*Ext3) + u_1$$

Neither internalizing nor externalizing problem behaviors exerted a significant effect on the relationship between ACEs and change in parenting stress over time. For internalizing problem behaviors, children with one ACE saw a decrease in slope of -.15, and children with three or more ACEs saw a decrease in slope of -.14 on parenting stress. There were no statistically significant effects of ACEs, change in problem behaviors, or their interactions on parenting stress. These results are shown in Table 4.

DISCUSSION

Since the original ACE study by Felitti et al. in 1998, researchers have repeatedly demonstrated the significant impact of ACEs on mental and physical health. ACEs are consistently associated with developmental, behavioral, and physical health problems in adolescence and adulthood (Burke et al., 2011; Hunt et al., 2017). Despite mounting interest in the effects of ACEs from both academia and the public, few studies have examined the relationship between ACEs and changes in internalizing and externalizing problem behaviors using a longitudinal approach with a sample of families at increased risk of experiencing poverty and adversity. The present study extends observations to socially, racially, and economically diverse groups from across the US. Furthermore, many ACE studies use retrospective reports of ACEs from adolescents or adults and are not able to map the change in problem behaviors across both childhood and adolescence. Additionally, few studies have examined the extent to which parenting stress throughout child development influences changes in child problem behaviors post-maltreatment.

The purpose of this study was to examine the effects of ACEs and parenting stress on internalizing and externalizing problem behaviors within a longitudinal framework in a sample of children born to mostly unmarried mothers who are at-risk of living in poverty. Hierarchical linear growth curve analyses were used to examine both the change of problem behaviors across childhood and adolescence, as well as how ACEs and parenting stress exert changes in problem behaviors over time.

Initial Growth Curve Analyses

This study first examined the changes in problem behaviors over time. Both internalizing and externalizing problem behaviors increased over time, independent of the effects of parenting stress and ACEs. This finding is generally in line with similar studies that examined the trajectories of internalizing and externalizing problem behaviors. Children who demonstrate difficulties in regulating their behavior at age 3, tend to continue to engage in maladaptive behaviors throughout elementary school (Mathiesen et al., 2009). That being said, many studies have found that as children mature, mean levels of externalizing problems typically decrease over time whereas levels of internalizing problems increase (Mathiesen et al., 2009; Gilliom & Shaw, 2004).

Initial growth curves of parenting stress indicated that parenting stress significantly increased between the ages of five and 15, suggesting that as children continued to develop, parents were more frequently endorsing agreement with statements regarding feeling trapped or worn out by parenting responsibilities. Despite the limitations of the parenting stress variable used in the present study, this finding is a unique contribution to the field of parenting stress research because few studies have examined changes in parenting stress across both childhood and adolescence. Although the parenting stress measure used in this study may not accurately capture parenting stress as a whole, it is likely capturing a domain of parenting stress, and this finding suggests that at least some of what makes up the construct of parenting stress increases as children progress through childhood and adolescence.

Main Effects of ACEs, Change in Parenting Stress and Change in Internalizing and Externalizing Problem Behaviors

Analyses conducted to examine the impact of ACEs on parenting stress and problem behaviors yielded interesting results. For parenting stress, results were surprising and contradictory to what was expected. As the number of ACEs increased, the amount of parenting stress experienced actually decreased over time. This is an unexpected finding as it was hypothesized that as the number of ACEs increased, so too would parenting stress over time. This finding may in part be explained by the limited nature of the parenting stress scale used in this dataset. Parenting stress was measured using four items which may not accurately capture the stress parents experience when raising children through adolescence. These four items ("Taking care of children is harder than I thought it would be," "I feel trapped by my responsibilities as a parent," "I find taking care of my child is much more work than pleasure," and "I often feel tired, worn out, or exhausted from raising a family") may only reflect one domain of parenting stress, such as the demandingness of parenting. Although the four items used to measure parenting stress were adapted from the Parenting Stress Index (PSI; Abidin, 1995), the PSI is comprised of 120 items with six subscales, and the short form has 36 items with three subscales. Thus, it is likely that, although the 4-item measure used in this study had adequate internal consistency, it was too abbreviated to fully capture the experience of parenting stress. Likely, the four parenting stress items used in the present study represent a distinct construct of parenting stress but do not adequately represent parenting stress in its entirety. For example, Haskett et al (2006) found in a factor analysis of the PSI-SF that two factors were extracted from the scale which were labeled personal stress and childrearing stress with the latter accounting for more variance in other measures of child problem behavior and in the prediction of parenting practices related ACEs. The four items used in the Fragile Families and Child Wellbeing Study align with the personal stress factor. Furthermore, within the parenting stress slope variable created for the main effects and moderating variable analyses, there was significant variability, limiting its consistency across parents to produce stable effects in change of slope over time.

Main effects analyzed in this study also examined whether exposure to ACEs by age five changed the level and slope of internalizing and externalizing problem behaviors. It was hypothesized that there would be a significant positive relationship between the number of ACEs and change in problem behaviors over time. The findings supported this hypothesis. When the dichotomized ACEs variables were added into the level 2 model, internalizing and externalizing problem behaviors significantly increased above and beyond the changes noted without ACEs. Thus, as the number of ACEs increased, so too did problem behaviors over time. Problem behaviors were measured on a 3-point Likert scale, and parents endorsed whether a statement about a problem behavior was (0) *not true*, (1) *somewhat true*, or (2) *very true* for their child. When examining the effect of ACEs on internalizing problem behaviors, the average item score for children with three or more ACEs increased from .4 at age five to 1.46 at age 15. This difference is reflected in parents endorsing more internalizing problem behaviors as being somewhat or often true for their children versus endorsing that a behavior is only sometimes true for a child. The results are similar for changes in externalizing behavior over time, as well. The average item score for children with three or more ACEs increased from .53 to 1.45, which again is a difference between rating a behavior as never or rarely true and rating a behavior as often true. As noted in Figure 2 and 3, the increase in internalizing and externalizing problem behaviors over time between children with no ACEs and children with 3 or more was statistically significant and suggest that the experience of childhood adversity considerably increases the amount of problem behaviors that a child engages in, and that childhood adversity exerts a significant effect on behavior over at least 10 years after the initial measurement of adversity, not just in the immediate aftermath of adversity.

Results from the main effects of ACEs on problem behaviors were consistent with prior research indicating that children's reactions to adversity often result in impairments across multiple domains of development, including emotional and behavioral regulation, which in turn lead to increased aggression, impulsivity, and symptoms of depression and anxiety (Cromer et al., 2017; Shields et al., 1998; Teague, 2013). Understanding children's immediate and long-term reactions to adversity is key to developing appropriate interventions that increase protective factors and promote self-regulation, such as the implementation of trauma-informed practices across settings that serve children and adolescences (home, daycare, school, medical clinics, etc.) (Dym Bartlett et al., 2018; Purvis et al., 2015). As children mature into adolescence, implementing novel strategies at each developmental stage in order to address increasing or new problem behaviors is important in protecting children's long-term mental, behavioral, and physical health.

Moderating Effects of Parenting Stress and ACEs on Internalizing and Externalizing Problem Behaviors and Moderation Effects of Internalizing and Externalizing Problem Behaviors on Parenting Stress

This study also examined whether parenting stress moderated the relationship between ACEs and the level and change in child problem behaviors over time. Results did not support the hypothesis that parenting stress influences the relationship between ACEs and changes in problem behaviors over time. The findings indicate that parenting stress did not exert a significant effect on the relationship between ACEs and child problem behaviors, and in fact, the small effect that it had was an inverse relationship, indicating that as parenting stress increases, the levels of problem behaviors among children with ACEs slightly decreases. In a similarly surprising result, neither internalizing nor externalizing problem behaviors exerted a significant effect on the relationship between ACEs and changes in parenting stress over time. As previously stated, these findings may be attributed to the limited nature of the parenting stress variable used in this study. Many covariates influence parenting stress and parenting behavior including the ability to adapt to change, one's feelings of competence in the role of a parent, and the amount of isolation from peers or support persons experienced by a parent (Morgan et al., 2002). In order to fully explore the effect of parenting stress on the relationship between ACEs and problem behaviors, a variable that more accurately captures the complex construct of parenting stress should be used.

Generally, the findings from the present study were aligned with results from prior work examining the impact of childhood adversity on problem behaviors. The results of this study present a unique contribution to the field of childhood adversity, as the data used were collected from a particularly vulnerable population. Although data were nationally representative, oversampling was used to capture a group of families that had disproportionately unmarried births, were of minority race/ethnicity, had limited maternal educational attainment, and were low income. Capturing the effects of ACEs on problem behaviors within this population is critical, as there tend to be fewer resources and protective factors compared to more advantaged or protected families, and as such, there may be an increase risk in the development of problem behaviors over time.

Limitations and Future Directions

There are several limitations of note in this study. Of primary concern is that ACEs were not measured after age five, and therefore these results do not account for any adversity a child may have experienced as they continued to develop. Given this limitation, it's possible that the changes in the slope of problem behaviors over time may be confounded by additional adverse experiences that were not accounted for in the dataset. Furthermore, in this study, all ACEs were summed into a total ACE exposure score, and the individual influences of each adverse experience were not used to predict outcomes. As such, the total ACE score may mask how certain types of ACEs have a greater influence on the development of problem behaviors than others. That being said, research indicates that the cumulative effect of ACEs exerts greater influence than that of individual ACEs on behavioral problems (Hunt et al., 2017).

Additionally, the data presented in this study represents mothers' perceptions of parenting stress and child problem behaviors. Apart from data collected on ACEs at age five, information from fathers was not used in this study. The conclusions drawn from this study would be stronger if child characteristics were assessed according to paternal report, as well. Future studies should examine if these results hold true when fathers' experiences are considered.

As previously mentioned, this study relied on a limited measurement of parenting stress. Future studies should continue to investigate whether rearing a child with a history of adversity affects the trajectory of parenting stress over time, and whether parenting stress influences child problem behavior outcomes among children with ACEs.

Finally, given the nature of the dataset and the constructs studied, the measures included in this study were significantly skewed when the raw scores were extrapolated into standard scores based on z-score distribution within the sample. Because of this, raw score data from the problem behavior scales were used, which reduced the skewness of the problem behavior measures, although children's age five scores were still skewed, which probably increased the individual variability in the growth curve analyses.

Despite these caveats, the present study contributes to existing literature on childhood adversity and problem behaviors. The current findings expand upon the original Felitti et al.

(1998) ACE work by using a longitudinal approach and examining the moderating effects of other interpersonal factors, such as parenting stress. Furthermore, this study extends observations to socially, racially, and economically diverse groups within the population to gain a greater awareness of how potentially vulnerable families may be impacted by ACEs.

Ultimately, the relationship between childhood adversity and the development of problem behaviors is complex and requires further study. While this study examined the risk factor of high levels of parenting stress among families that have encountered adversity, investigating the interaction between risk and protective factors is a complex challenge that will likely yield benefits in designing and implementing interventions for children with ACEs. Protective factors of interest in the context of this study's findings include level of parent self-competence in handling child behavior problems, additional social support for parents such as spouses, grandparents, or friends, and the quality of the parent-child relationship. Future studies should examine how risk and protective factors interact to change the trajectory of problem behaviors throughout childhood and adolescence.

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Table 1

Demographic Characteristics and Adverse Childhood Experiences of the Sample

Full Sample (2,626) (48.5% females)	Total Percent	Percent Missing
Race		
Black	65.1%	
White	24.1%	
Asian	2.4%	
Native American/Alaskan	0.8%	
Hispanic	17.9%	
ACEs		
Neglect	11.2%	0.8%
Physical Abuse	8.9%	3.4%
Emotional Abuse	12.4%	0.2%
Anxiety/Depression	16.8%	0%
Substance Abuse	0.2%	0.3%
Incarceration	42%	3.6%
Domestic Violence	47%	0%
Average No. ACEs	1.57 (1.4)	

Note: Race percentages do not add up to 100 due to participants identifying as multiple races/ethnicities.

Table 2

Characteristics of the Child Behavior Checklist and Parenting Stress

	Mean	SD	α	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.
PSI														
1. Year 5	2.82	.68	.660											
2. Year 9	2.98	.68	.659	.47**										
3. Year 15	2.94	.70	.682	.43**	.50**									
CBCL Internalizing														
4. Year 5	.27	.22	.709	-.20**	-.18**	-.13**								
5. Year 9	1.19	.22	.795	-.15**	-.20**	-.15**	.35**							
6. Year 15	1.27	.31	.795	-.14**	-.18**	-.27**	.19**	.31**						
CBCL Externalizing														
7. Year 5	.40	.25	.831	-.22**	-.19**	-.18**	.47**	.22**	.20**					
8. Year 9	1.24	.23	.870	-.17**	-.22**	-.19**	.21**	.61**	.27**	.45**				
9. Year 15	1.23	.26	.886	-.14**	-.18**	-.31**	.12	.21**	.51**	.36**	.44**			
10. Slope of PSI	.04	.23		-.48**	.03	.54**	.07**	-.01	-.12**	.04*	-.03	-.16**		

Table 2 Continued

	Mean	SD	α	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.
11. Slope of Int	.99	.35		-.00	-.03	-.11**	-.30**	.06**	.63**	-.03	.10**	.32**	.05**	
12. Slope of Ext	.83	.29		.04	.01	-.08**	-.18**	.024	.25**	-.31**	.03	.47**	.06**	.79**

Note: Mean scores represent the mean of summed items divided by the number of items for PSI (Parent Stress Index), CBCL Internalizing, and CBCL Externalizing scales. The mean for the Slope of PSI and Slope of Int (Internalizing Problems) and Slope of Ex (Externalizing Problems) are the means of each cases' slope per scale. α represents Cronbach's alpha. * $p \leq 0.05$ ** $p \leq 0.01$

Table 3

Linear Growth Curves, Main Effects of Adverse Childhood Experiences, and Moderation with Parent Stress

Fixed Effects	Parenting Stress	Internalizing Problems	Externalizing Problems
	Growth Curve Analyses		
Intercept	2.85*** (.013)	.40*** (.01)	.53*** (.01)
Slope	.06*** (.007)	.50*** (.004)	.42*** (.004)
	Main Effects of ACEs and Change in Parenting Stress or Problem Behaviors		
Intercept	3.06*** (.02)	.40*** (.006)	.53*** (.006)
Slope	.62*** (.06)	.48*** (.01)	.40*** (.01)
1 ACE	-.18*** (.07)	.02* (.01)	.01 (.009)
2 ACEs	-.2*** (.08)	.02* (.01)	.03*** (.01)
≥ 3 ACEs	-.23*** (.08)	.05*** (.012)	.06*** (.011)
Parenting Stress		-.016*** (.009)	-.019*** (.009)
Internalizing	.00 (.02)		
Externalizing	.01 (.02)		
	Moderating Effect of Parenting Stress		
Intercept		.40*** (.01)	.53*** (.01)
Slope		.50*** (.01)	.40*** (.01)
1 ACE		.02*** (.01)	.01*** (.009)
2 ACEs		.03*** (.011)	.03*** (.01)
≥ 3 ACEs		.05*** (.012)	.06*** (.011)

Table 3 Continued

Fixed Effects	Parenting Stress	Internalizing Problems	Externalizing Problems
1 ACE x PS		-.003 (.011)	.004 (.01)
2 ACEs x PS		-.004 (.012)	-.012 (.011)
≥ 3 ACEs x PS		-.004 (.013)	-.008 (.012)

Note: Coefficients (standard errors in parentheses) are presented. * $p \leq 0.05$, *** $p \leq 0.001$

Table 4

Moderating Effects of Internalizing and Externalizing Problem Behaviors and the Interaction with ACEs on Parenting Stress

Fixed Effects	Parenting Stress		Parenting Stress
Intercept	2.85***	Intercept	2.85***
Slope	.17***	Slope	.13***
Slope in INT	-.09 (.05)	Slope in EXT	-.04 (.06)
1 ACE	-.15*** (.06)	1 ACE	-.12 (.07)
2 ACE	-.12 (.07)	2 ACE	-.08 (.07)
3+ ACEs	-.14* (.07)	3+ ACEs	-.07 (.08)
1 ACE x INT	.13 (.07)	1 ACE x EXT	.10 (.07)
2 ACE x INT	.10 (.07)	2 ACE x EXT	.06 (.08)
3+ ACEs x INT	.10 (.08)	3+ ACEs x EXT	.02 (.08)

Note: Coefficients (standard errors in parentheses) are presented. * $p \leq 0.05$, *** $p \leq 0.001$

Figure 1

Moderating Effects of Parenting Stress on ACEs and Development of Problem Behaviors;

Moderating Effects of Problem Behaviors on Parenting Stress

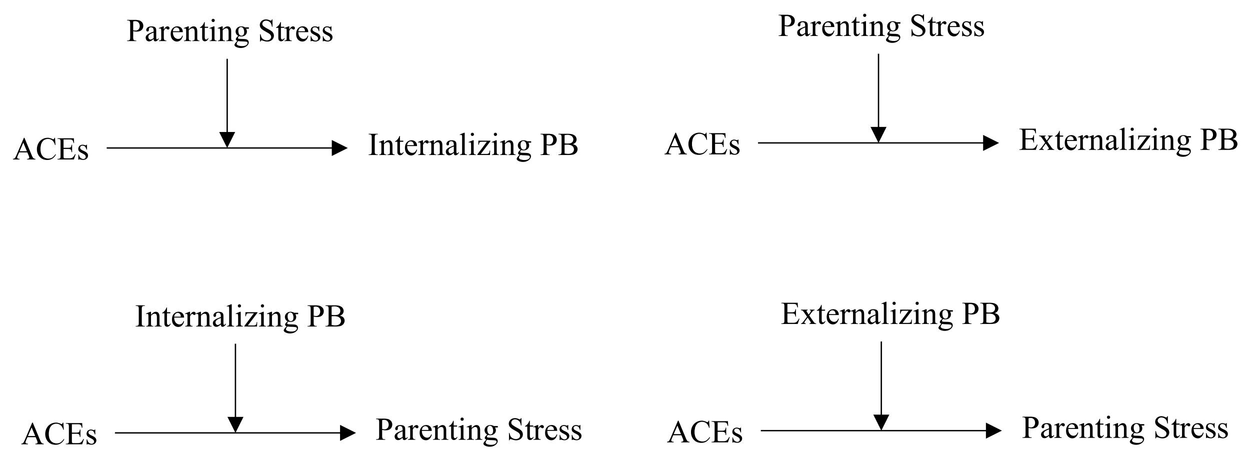
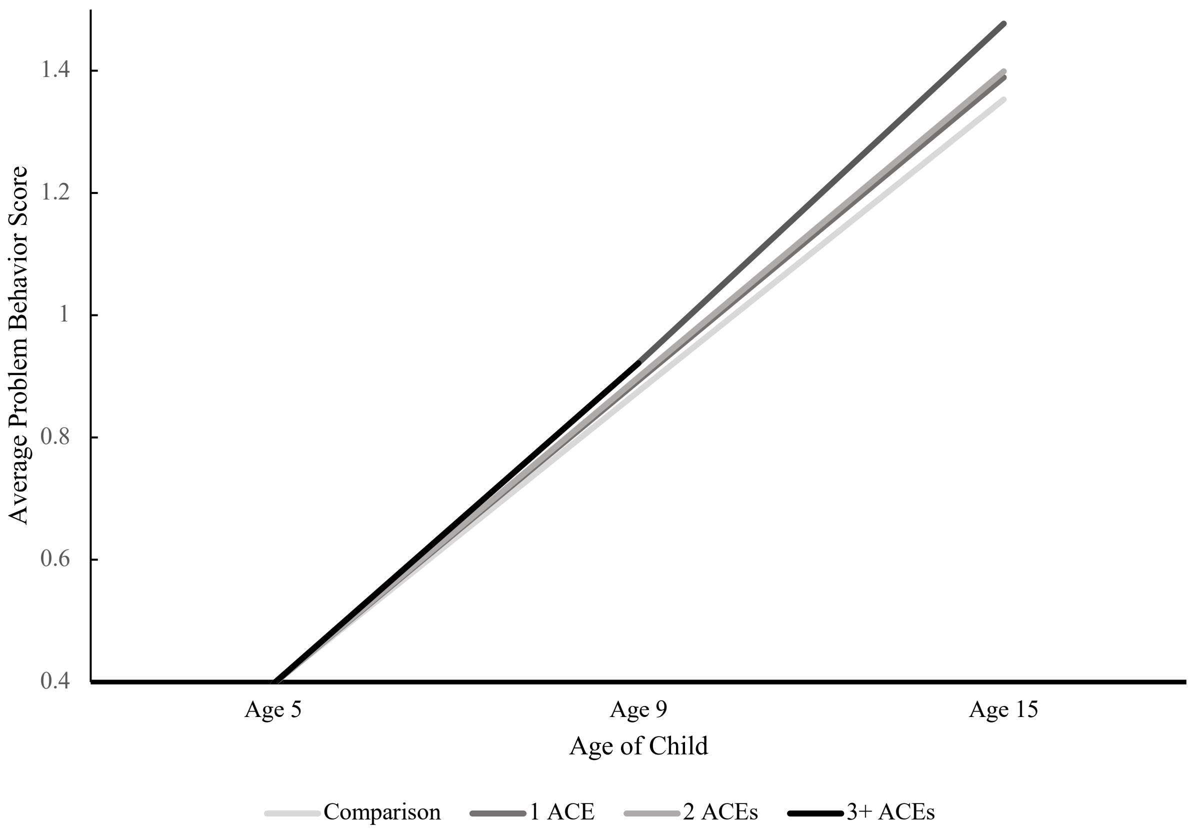


Figure 2

Effects of ACEs on Internalizing Problem Behaviors Over Time



Note: The average problem behavior score represents the average item score within the Internalizing Problem Behaviors scale.

Figure 3

Effects of ACEs on Externalizing Problem Behaviors Over Time

Note: The average problem behavior score represents the average item score within the Externalizing Problem Behaviors scale.