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Early Life Adversity and Prosocial Behavior in Adolescence: The Mediating Role of Childhood Empathy

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ABSTRACT

Introduction: Extensive evidence demonstrates that early life adversity (ELA) has enduring contributions to psychological and physical problems, yet little research has examined how ELA may potentially influence positive adaptation. In this longitudinal, multi-method study, we explored prospective relations from childhood ELA subtypes (i.e., relational, environmental, biological) to adolescents' observed prosocial behavior (i.e., resource allocation to benefit others) via parent reports of childhood cognitive and affective empathy.

Methods: Participants were 250 youth (50% assigned female at birth; 46% Latine, 18% Black, 11.2% White, 0.4% Asian, and 24.4% multiracial) and parents who completed laboratory assessments at ages 4, 8, or 17. ELA across the first 4 years of life and childhood empathy (age 8) were assessed via parent reports, whereas prosocial behavior was measured using teacher reports (age 8) and a computer-based behavioral assessment (age 17).

Results: Controlling for youth's assigned sex, ethnicity-race, and prior prosocial behavior, path analyses revealed distinct pathways across ELA subtypes. A significant path from relational ELA to decreased prosocial behavior was mediated by lower affective empathy, aligning with deficit-based frameworks of adversity. However, consistent with strength-based perspectives, a significant path from biological ELA to increased prosocial behavior was mediated by higher affective empathy. Neither environmental ELA nor cognitive empathy was associated with prosocial behavior.

Conclusions: Future research should explore socialization factors and interventions that enhance affective empathy among adolescents with biological and relational ELA, while considering multiple forms of prosocial behavior (e.g., helping vs. comforting) and additional mechanisms that may underlie these observed pathways (e.g., sensitive parenting, motivation).

Early life adversity (ELA) refers to negative experiences (e.g., childhood maltreatment, chronic illness) that deviate from normative childhood experiences with resultant effects on psychological, behavioral, and neurobiological development (McLaughlin 2016). Relative to well-documented deleterious ELA effects on physical functioning, mental health, interpersonal relationships, and neurological development (Kalmakis and Chandler 2015), fewer studies have examined ELA effects on positive

outcomes, such as prosocial behavior (i.e., acts that benefit the well-being of others; Eisenberg and Beilin 1982). From a deficit-based perspective, several models (e.g., cumulative risk, threat-deprivation; Evans et al. 2013; McLaughlin et al. 2014) suggest that ELA impedes positive adaptation and undermines prosocial behavior. In contrast, strength-based models of posttraumatic growth (Tedeschi and Calhoun 2004) and altruism born of suffering (Vollhardt 2009) hold that ELA may

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promote positive outcomes, including empathy development and consequently, prosocial behavior.

Most studies evaluating these frameworks have been limited to cross-sectional designs that focus on single indicators of ELA and behavioral self-reports with adult samples (e.g., Chen et al. 2023; Lim and DeSteno 2016), highlighting the need for longitudinal studies to clarify directional relations and underlying mechanisms in pathways from multiple ELA experiences to prosocial outcomes. The current study addressed these gaps by employing multi-informant, multi-method longitudinal data to evaluate relations between three subtypes of ELA (i.e., relational, environmental, and biological) assessed across the first 4 years of life and adolescents' prosocial behavior at age 17 via parent reports of children's cognitive and affective empathy at age 8. Given youth's comparatively malleability and heightened sensitivity to contextual influences (Sroufe 2009), as well as evidence that different ELA experiences may have specific developmental effects via overlapping and distinct mechanisms (Park et al. 2021; Waters and Gould 2022), this study evaluated pathways from specific ELA subtypes to adolescents' prosocial behavior via childhood empathy to inform the design and implementation of prevention and intervention efforts that promote positive development among ELA-exposed youth.

1 | ELA and Prosocial Behavior

Previous studies using cumulative risk models have documented the collective effect of multiple ELAs on later physical and mental health (Chapman et al. 2004; Rasmussen et al. 2019). However, these models fail to capture how various subtypes of co-occurring ELA events may have different developmental implications. Examining specific subtypes of ELA experiences that share core characteristics may clarify complex and inconsistent patterns of association between ELA and prosocial behavior observed in the current literature. Following prior work [Bridgewater et al. 2024], we conceptualized ELA events based on their source as either relational (e.g., childhood maltreatment, parental psychopathology), environmental (e.g., neighborhood risk, family poverty), or biological (e.g., prenatal substance use, pregnancy complications). This approach not only emphasized the unique effects of each ELA subtype on prosocial development, but also captured ELA events that have not been adequately addressed in existing typologies, particularly vis-à-vis the biological subtype. Moreover, we evaluated distinct associations between each ELA subtype and adolescents' prosocial behavior as explained by both affective and cognitive components of childhood empathy.

Prosocial behavior encompasses actions aimed at enhancing the welfare of others (e.g., helping, comforting, sharing; Eisenberg and Beilin 1982) and is positively related to multiple facets of well-being in adolescence (e.g., academic achievement, self-esteem, psychosocial adjustment; Caprara et al. 2000; Laible et al. 2004). While research has investigated the influence of ELA on predominantly negative developmental outcomes (e.g., psychopathology; Masten et al. 2021), the potential effects of ELA on prosocial behavior have received relatively less attention. Adolescence is an important developmental period for examining prosocial behavior as youth gain more independence and encounter

new opportunities to engage in voluntary acts benefiting others (Fabes et al. 1999). Considering that beliefs and behaviors in adolescence often carry over into adulthood, understanding if and how ELA influences adolescents' prosocial behavior is crucial for supporting positive adaptation in youth with a history of ELA.

Rooted in the idea that ELA undermines psychological and behavioral development (Evans et al. 2013), scholars supporting a deficit-based perspective have documented negative effects of relational (e.g., childhood maltreatment, family violence exposure; Carvalho et al. 2019; Gao et al. 2023) and environmental (e.g., natural disasters, neighborhood poverty and violence, household economic disadvantages; McMahon et al. 2013; Safran et al. 2016) ELA events on prosocial behavior. For example, children who report higher levels of community violence exposure receive lower levels of peer-rated prosocial behavior (McMahon et al. 2013). Likewise, in a cross-sectional study, Lu and Xiao (2019) showed that parent reports of childhood exposure to ELA (e.g., parental incarceration, ethnic-racial discrimination, low family income) correlated with lower levels of parent-reported civic engagement in adolescence (i.e., community service and out-of-school activities).

In contrast, strength-based models suggest that positive outcomes can arise from negative experiences, such that ELA can foster posttraumatic growth and prosocial responses to others in distress. For example, Vollhardt (2009) proposed a theory of altruism born of suffering wherein adversity-exposed individuals would be more likely to empathize with others' distress and display prosocial responses to alleviate suffering. Support for this theory stems from research on altruism among adult survivors of community-level violence or natural disasters (Oliner 2002; Rodríguez et al. 2006) and studies showing positive links between ELA events (e.g., peer victimization, maltreatment, disasters) and adolescents' prosocial behaviors and intentions (Batanova et al. 2014; Keil et al. 2019; Liu et al. 2021). Consistent with these strength-based models, research has documented positive effects of relational (e.g., childhood maltreatment; Keil et al. 2019) and environmental ELA events (e.g., natural disasters; Lemieux 2014) on prosocial behavior. Thus, the current study sought to evaluate potential pathways from relational, environmental, and biological ELA subtypes to prosocial outcomes in adolescence in an effort to clarify the mixed patterns observed in prior research on ELA and prosocial behavior.

1.1 | ELA and Prosocial Behavior: The Mediating Role of Empathy

Prosocial behavior is thought to be informed and motivated by empathy, which includes a cognitive component (i.e., a capacity to understand another person's emotional state) and an affective component (i.e., a capacity to elicit an appropriate emotional response to another person's emotional state; Dadds et al. 2008). Extensive research shows empathy is a key facilitator of prosocial behavior (e.g., Penner et al. 2005; Stocks et al. 2009). Empathic capacities enable and motivate individuals to recognize others' negative emotions, vicariously experience others' distress, and engage prosocial efforts to alleviate suffering. While empathy promotes prosocial behavior in children and adolescents (Sahdra et al. 2015), less work has examined specific roles of cognitive versus affective empathy in prosocial

behavior development. For instance, Berger et al. (2015) found high levels of both cognitive and affective empathy among adolescents with higher levels of prosocial behavior and lower levels of aggressive tendencies. Similarly, a meta-analysis by Yin and Wang (2023) found moderate positive effect sizes of both cognitive empathy ($r = 0.32$) and affective empathy ($r = 0.30$) in relation to prosocial behavior across adult and child samples.

From a deficit-based perspective, attachment (Bowlby 1982) and social learning (Bandura and Walters 1963) theories suggest that children exposed to relational and environmental ELA may develop negative relational representations and imitate inadequate empathic responses (e.g., insensitive parenting, community violence) in ways that compromise their social understanding, empathy development, and, ultimately, prosocial behavior. Thus, deficits in empathy development may mediate negative relations between ELA and positive development. Cross-sectional evidence suggests that both relational ELA (e.g., childhood maltreatment; Yu et al. 2020) and environmental ELA (e.g., neighborhood crime; Sprinkle 2009) are associated with empathy impairments in children and adolescents. In addition, biological ELA may involve cognitive or biological vulnerabilities that undermine empathy. For example, Campbell et al. (2015) found that children born extremely preterm (i.e., less than 28 weeks) scored lower on cognitive, affective, and behavioral aspects of empathy, as well as attentional abilities, as compared to their full-term peers. Notwithstanding these negative effects, and consistent with Vollhardt's (2009) strength-based perspective, prior research has also shown positive ELA effects on empathy development. For example, Komatsu et al. (2024) found that at-risk girls exposed to negative events in close relationships, domestic violence, and psychological abuse (i.e., relational ELA), but not to community violence (i.e., environmental ELA), had higher levels of empathy (Komatsu et al. 2024). Although little is known regarding how ELA subtypes relate to cognitive versus affective empathy, meta-analytic evidence suggests that these associations may be nuanced. For example, relational ELA (i.e., childhood maltreatment) may be associated with deficits in cognitive empathy, but not affective empathy (Zhang et al. 2024).

A few studies have evaluated the mediating role of empathy in associations between ELA and prosocial behavior, but most have been cross-sectional. In line with deficit-based models, Chen et al. (2023) found that young adults' reports of emotional neglect were negatively correlated with both perspective-taking (i.e., cognitive empathy) and empathic concern (i.e., affective empathy), and, in turn, both empathy deficits were negatively associated with prosocial behavior. Similarly, Yu et al. (2020) showed that youth-reported global empathy concurrently mediated negative relations between retrospectively reported childhood maltreatment and prosocial tendencies. However, consistent with a strength-based perspective, Lim and DeSteno (2016) found that adults' reports of ELA were positively correlated with both perspective-taking (i.e., cognitive empathy) and empathic concern (i.e., affective empathy), but only empathic concern was positively associated with compassion, which, in turn, was related to higher levels of prosocial behavior.

Although both cognitive and affective empathy are expected to positively relate to prosocial behavior, they may do so through

distinct processes. Cognitive empathy supports the capacity to adopt another person's perspective and understand their emotional state, which may facilitate identifying others' needs and selecting appropriate prosocial responses (Decety and Jackson 2004). Affective empathy encompasses the capacity to share or resonate with another person's emotional experience, which may motivate empathic concern and emotional engagement (Batson 2011). Together, these empathy components may operate in a complementary manner, with cognitive empathy supporting the identification of others' needs and affective empathy motivating emotional engagement and prosocial responses to those needs. Although cognitive and affective empathy likely interact (Jones et al. 2010), they are distinctive, with both overlapping and unique neural underpinnings (Schurz et al. 2014; Dziobek et al. 2011; Shamay-Tsoory 2011). Prior research has yielded mixed findings regarding the relative contributions of cognitive and affective empathy components to prosocial behavior. Some studies suggest stronger associations between affective empathy and prosocial behavior (Batson 2011; Murakami et al. 2014), others highlight the role of cognitive empathy in prosocial responses (Kim et al. 2020), and still others find comparable positive relations between both cognitive and affective empathy and prosocial behavior (Yin and Wang 2023). Therefore, we expected both cognitive and affective empathy components to mediate pathways from ELA subtypes to prosocial behavior.

In sum, this investigation explored longitudinal associations from three ELA subtypes (i.e., relational, environmental, and biological) to youth's empathy (i.e., cognitive and affective components) and prosocial behavior (i.e., resource allocation to benefit others). Although ELA subtypes are likely interrelated and may have overlapping effects, previous research suggests that different forms of ELA can exert distinct influences on child development (e.g., McLaughlin et al. 2014; Sheridan and McLaughlin 2014). For example, relational ELA (e.g., parental loss, childhood maltreatment) may undermine empathy development and prosocial behavior because malevolent or disrupted parent-child interactions can compromise secure attachment and emotional attunement (Bowlby 1982), which are essential for scaffolding children's abilities to understand, share, and respond appropriately to others' emotions (Eisenberg et al. 2006; Thompson and Gullone 2008). At the same time, however, relational ELA may heighten children's sensitivity to others' emotional states and promote perspective-taking, which may foster empathy development and prosocial responding (Berzenski and Yates 2022; Chen et al. 2025; Katz and Tener 2021). In line with deficit- and strength-based perspectives, some research has demonstrated an association between relational ELA and poorer socioemotional functioning (Kim and Cicchetti 2010), whereas other work suggests that relational ELA may be related to higher levels of socioemotional adjustment via posttraumatic growth (Meyerson et al. 2011).

Similarly, environmental ELA (e.g., economic strain, residential mobility) may have unique effects on empathy development and prosocial behavior. On the one hand, consistent with the family stress model (Conger et al. 1992; Conger and Donnellan 2007), environmental ELA may strain caregivers' psychological and material resources, thereby reducing their capacity for emotionally sensitive and consistent parenting in

ways that limit children's opportunities for socioemotional learning, as well as the development of empathy and prosocial behavior (Morris et al. 2007; Neppl et al. 2016). On the other hand, environmental ELA does not necessarily entail compromised parenting, and may increase children's awareness of others' needs or shared hardships in ways that promote empathy and prosocial responding toward others facing similar challenges (Wagmiller and Adelman 2009). Indeed, while some research has indicated that exposure to economic hardship is associated with disruptions in socioemotional functioning (McLoyd 1998; Evans and Kim 2013), other findings suggest lower socioeconomic status enhances empathy and, by extension, prosocial behavior (Liu et al. 2023).

Finally, biological ELA (e.g., perinatal complications, early health issues) may negatively affect early stress-response and regulatory systems, as well as neurocognitive processes involved in emotional sensitivity, social understanding, perspective-taking, and emotional regulation (Shonkoff et al. 2012), thereby undermining the development of empathy and prosocial behavior (Hastings et al. 2000). At the same time, these same biological vulnerabilities may also evoke higher levels of caregiver attention, monitoring, and attunement in ways that promote children's socioemotional and behavioral development (Bornstein 2015). Thus, biological ELA may hinder and/or promote children's empathy and prosocial development at the same time via distinct developmental pathways. This may explain prior research showing that early biological risk is associated with difficulties in regulatory and socioemotional processes (Blair and Raver 2012), but may also predict adaptive outcomes when caregiving support is high (Feldman 2007). Together, prior theory and research support the current exploration of overlapping, yet divergent pathways from ELA subtypes to empathy development and prosocial behavior.

1.2 | The Current Study

This study sought to address remaining gaps in the predominantly cross-sectional research literature examining ELA and prosocial behavior. In addition to cross-sectional designs, prior studies have employed cumulative rather than subtype-specific measures of adversity (e.g., Chapman et al. 2004) and have not distinguished between cognitive and affective empathy mediators (e.g., Yu et al. 2020). Thus, this investigation was among the first longitudinal studies to evaluate pathways from parent reports of children's relational, environmental, and biological ELA exposure across the first 4 years of life to adolescents' observed prosocial behavior at age 17 via intervening measures of children's cognitive and affective empathy at age 8. Importantly, we also employed a behavioral assessment of prosocial behavior (i.e., a computerized Dictator Game) to assess adolescents' prosocial resource allocation decisions (Brocklebank et al. 2011), which reduced validity threats common in self-report measures (e.g., social desirability, unreliable recall, intended vs. actual behavior; El Mallah 2020). Our focus on childhood and adolescence highlights developmental periods that are particularly salient for empathic and interpersonal development, aligns with recent calls to prioritize research on adolescent outcomes (Kahhale et al. 2025), and magnifies expected implications for prevention and intervention efforts.

Finally, we advanced beyond broadband studies of cumulative risk by evaluating subtypes of ELA (i.e., relational, environmental, and biological) and empathy (i.e., cognitive and affective) in pathways to prosocial behavior. Given mixed theoretical and empirical support across both deficit- and strength-based perspectives, we tested competing hypotheses for each ELA subtype. From a deficit-based perspective, we hypothesized that childhood ELA would be associated with lower empathy, which would subsequently be associated with decreased prosocial behavior. From a strength-based perspective, we predicted that ELA would be associated with enhanced empathy development and, in turn, increased prosocial behavior.

Harnessing the power of a longitudinal dataset with a socio-demographically diverse sample of parent-child dyads, we considered youth's assigned sex at birth (i.e., female vs. male), ethnicity-race (i.e., Latine vs. non-Latine), and prior levels of prosocial behavior at age 8 as covariates. Past research suggests that female children and adolescents are rated as having higher levels of prosocial behavior (Hastings et al. 2007; Xiao et al. 2019). Females also exhibit higher rates of empathy across assessments using self-reports (Baron-Cohen and Wheelwright 2004), facial cue reading (McClure 2000), and brain activity (Derntl et al. 2010). In addition, ethnicity-race may correlate with cultural practices that influence empathy and/or prosocial behavior development. For example, collectivistic values featuring a community orientation are positively associated with empathy and prosocial behavior to a greater degree than individualistic values that emphasize self-motivated and egocentric orientations (e.g., Chopik et al. 2016). Although prior research on empathy and prosocial behavior among Latine versus non-Latine individuals is sparse, traditional Latine cultural values of *respeto*, *familism*, or *religiousness* reflect collectivist values that may promote both socialization and expressions of empathy and prosocial behavior in Latine youth to a greater degree than their non-Latine peers (see Carlo et al. 2016 for review).

2 | Method

2.1 | Participants

The sample consisted of 250 parent-youth dyads participating in a longitudinal study of child development in Southern California. Youth were diverse with respect to ethnicity-race (46% Latine, 18% Black, 11.2% White, 0.4% Asian, and 24.4% multi-racial), assigned sex at birth (50% female, 50% male), and economic status (67.6% received government aid in the past year). The composition of the sample was representative of the Southern California region (U.S. Census Bureau 2008).

Participating parents were predominantly biological mothers (91.2%), stepmothers (0.8%), foster/adoptive mothers (3.6%), and extended kin serving in the parental role (e.g., grandmothers, aunts; 4.4%). At the first assessment, most parents were employed outside the home (67.2%) and in a married or committed relationship (76.4%). Education levels ranged from no high school degree or GED (16.7%), a high school degree or GED (14.2%), some college or technical school (55.4%), or a bachelor's or higher degree (13.7%). Dyads included in these analyses completed at least one laboratory assessment when youth were age 4 ($n = 250$, $M_{\text{age}} = 4.09$ years, $SD = 0.25$), age 8 ($n = 214$,

$M_{age} = 8.13$, $SD = 0.27$), and/or age 17 ($n = 191$, $M_{age} = 17.30$, $SD = 0.48$). Across waves, 227 (90.8%) dyads returned for at least one follow-up assessment. Dyads who completed all assessments ($n = 185$, 74%) did not statistically differ from those who did not ($n = 65$, 26%) on any study variables.

2.2 | Procedures

Parents were invited to participate in a longitudinal study of children's learning and development via flyers distributed to community-based childcare programs. Families were screened by phone and excluded if the child had a developmental disability or delay ($n = 3$), was unable to complete the assessment in English ($n = 4$), and/or was outside the target age range (45–54 months) at the beginning of the study (not tracked). At each wave, dyads completed a laboratory assessment, including youth and parent questionnaires and observational tasks. Parents received \$25–\$50 per assessment hour across waves, and youth were compensated with a gift at ages 4 and 8, and \$40 per assessment hour at age 17. Informed consent and assent were collected from the legal guardian and the participating youth (at ages 8 and 17), respectively. At age 8, each child's teacher received a mailed questionnaire 1 month after the child's classroom entry to ensure adequate time for familiarity with the child. Teachers were compensated with a \$20 gift card upon receipt of the completed questionnaire. All procedures were approved by the human research review board of the participating university.

2.3 | Measures

2.3.1 | Early Life Adversity (ELA)

Across the first 4 years of life, parents reported on their child's lifetime exposure to 33 unique ELA events during a semi-structured interview tapping adverse childhood experiences within and beyond the home setting. The relational subtype included 14 ELAs, primarily assessed using the Early Trauma Inventory (Bremner et al. 2000), including the child's exposure to parental loss (e.g., death), separation (e.g., incarceration), physical illness (e.g., diabetes), and maltreatment experiences (e.g., physical, sexual, and emotional abuse). The environmental subtype included nine ELAs that captured the child's experiences of poverty, residential stress (e.g., overcrowding, homelessness), community violence, and neighborhood risks (e.g., crime rates, vacant homes; Federal Bureau of Investigation 2007; U.S. Census Bureau 2008). The biological subtype included 10 ELAs tapping health concerns prior to and after the child's delivery (e.g., prenatal substance use, gestational age) and early childhood health problems across the first 4 years of life (see Bridgewater et al. 2024 for a detailed description of the ELA coding). The severity of each of the 33 ELA events was evaluated by two trained coders who were naïve to other information about the family. Each ELA event was coded for severity on a 4-point scale from 0 (*no exposure*), 1 (*mild*), 2 (*moderate*), or 3 (*severe*), except maltreatment severity, which was coded based on the intensity and frequency of each maltreatment type (i.e., sexual abuse, physical abuse, emotional abuse, neglect) across 0 (*no occurrence*), 1 (*mild occurrence*; i.e., low/moderate intensity and low frequency), 2 (*moderate occurrence*; i.e., high intensity and low frequency or low

intensity and high frequency), and 3 (*severe occurrence*; i.e., high intensity and high frequency; McGee et al. 1995). Each ELA event severity score was standardized and composited within each subtype to indicate each child's relational ($ICC = 0.93$), environmental ($ICC = 0.90$), and biological ($ICC = 0.95$) ELA. ELA categories were mutually exclusive so that each individual ELA event (e.g., poverty) was included in only one ELA subtype (e.g., environmental ELA).

2.3.2 | Childhood Empathy

At age 8, parents completed the Griffith Empathy Measure (GEM; Dadds et al. 2008) to assess their child's empathy. Cognitive empathy was indicated by six items assessing the child's understanding of others' emotions (e.g., "My child can't understand why other people get upset" $\alpha = 0.57$). Affective empathy consisted of nine items evaluating the child's capacity to experience and share others' emotions (e.g., "My child becomes sad when other children around him/her are sad" $\alpha = 0.74$). Each item was rated from *strongly disagree* (1) to *strongly agree* (8). Items on each subscale were averaged, with higher scores indicating greater empathy.

2.3.3 | Prosocial Behavior

Prosocial behavior was assessed at ages 8 and 17 using teacher reports and a behavioral computer task, respectively. Following the age 8 assessment, teachers completed the 5-item Prosocial scale of the Strengths and Difficulties Questionnaire (SDQ; Goodman 1997) rating how true each statement was for the child (e.g., "This child is helpful if someone is hurt/upset/feeling ill") from *never* (1) to *almost always* (5; $\alpha = 0.92$). At age 17, youth completed a computerized Dictator Game (Brocklebank et al. 2011). In six resource allocation trials, youth were instructed to distribute points between themselves and a fictive opponent without social repercussions (i.e., each trial was positioned with a new opponent, so the decision in one trial would not influence other trials). Youth could allocate more points, fewer points, or equal points to themselves and the opponent. Prosocial behavior was calculated as the difference between youth's allocation of total points given to the opponent versus kept, with positive values denoting greater prosocial behavior. The Dictator Game has evidenced good psychometric properties (Baumert et al. 2014).

2.4 | Data Preparation and Analytic Plan

Descriptive and bivariate analyses were conducted in SPSS Version 28. The mediation model was assessed using the *lavaan* package in RStudio (Rosseel 2012). All study variables met normality assumptions (Afifi et al. 2007). Data were missing for parent reports of biological ELA ($n = 3$, 1.2%), parent reports of cognitive and affective empathy at age 8 ($n = 92$, 36.8%), teacher reports of youths' prosocial behavior at age 8 ($n = 115$, 46%), and youth's prosocial decisions during the laboratory assessment at age 17 ($n = 72$, 28.8%). Missing parent reports of child empathy at age 8 were due to the late introduction of the measure in data collection ($n = 59$) and families missing the data wave ($n = 33$). Missing teacher reports at age 8 were due to families missing the data wave ($n = 36$), parent refusal of consent to release

school information ($n = 4$), insufficient information to locate the teacher ($n = 10$), teacher non-response ($n = 52$), incomplete teacher data ($n = 12$), or the child being homeschooled ($n = 1$). Missing youth data at age 17 were attributed to families missing the assessment ($n = 56$) and incomplete assessments ($n = 16$). Little 1988) MCAR test indicated data were missing completely at random, $\chi^2(18) = 17.96$, $p = 0.46$. Missing data were addressed using full-information maximum-likelihood (FIML) in the lavaan package in RStudio. A sensitivity analysis was conducted on the 73 participants with complete data across all waves.

A multivariate analysis of variance (MANOVA) examined mean differences across study variables by youth's assigned sex, ethnicity-race, and their interaction. Path analyses tested unique contributions of exposure to relational, environmental, and biological ELA to youth's prosocial behavior at age 17 via simultaneously estimated pathways through cognitive and affective empathy at age 8, while holding youth's assigned sex, ethnicity-race, and prior prosocial behavior at age 8 constant.

3 | Results

3.1 | Descriptive and Bivariate Analyses

Descriptive statistics and bivariate associations are shown in Table 1. The MANOVA revealed a significant main effect of assigned sex ($Wilks' \lambda = .70$, $p = 0.001$), with males having higher levels of biological ELA ($M = 0.18$) than females ($M = -0.12$; $p = 0.01$), whereas females were rated as having higher levels of prosocial behavior at age 8 ($M = 4.14$) than males ($M = 3.62$; $p < 0.01$). The main effect of ethnicity-race ($Wilks' \lambda = .89$, $p = 0.38$) and the interaction between sex and ethnicity-race ($Wilks' \lambda = .98$, $p = 0.98$) were not significant across study variables.

Bivariate correlations revealed positive associations among ELA subtypes. Relational ELA was negatively related to cognitive empathy at age 8 and prosocial behavior at ages 8 and 17. Environmental ELA was negatively associated with affective empathy at age 8. Biological ELA was negatively associated with prosocial behavior at age 8. Affective empathy was positively correlated with concurrent cognitive empathy at age 8. Lastly, affective empathy, but not cognitive empathy, was positively related to prosocial behavior at age 17.

3.2 | Primary Analyses

Path analyses evaluated relations from parent reports of ELA across the first 4 years of life to youth's computer-assessed prosocial behavior at age 17 via intervening parent reports of childhood cognitive and affective empathy at age 8, controlling for youth's assigned sex, ethnicity-race, and prior prosocial behavior. As shown in Table 2 and Figure 1, direct paths from relational, environmental, and biological ELA to youth's prosocial behavior were not significant. However, mediation analyses revealed an indirect negative path from relational ELA to prosocial behavior via lower levels of affective empathy, and an indirect positive path from biological ELA to prosocial behavior via higher levels of affective empathy. There were no significant indirect effects of environmental ELA on prosocial behavior via cognitive or affective empathy.

3.3 | Sensitivity Analysis

A sensitivity analysis using 73 cases with complete data across all waves (i.e., list-wise deletion) replicated these findings with an indirect effect from relational ELA to prosocial behavior via lower levels of affective empathy ($b = -0.49$, $\beta = -0.15$, $SE = 0.21$, $p = 0.02$). However, the indirect effect of biological ELA via affective empathy was not significant ($b = 0.10$, $\beta = 0.05$, $SE = 0.10$, $p = 0.31$). All other associations were consistent with those observed in the full sample.

4 | Discussion

This study employed multiple informants and methods to clarify longitudinal links among relational, environmental, and biological ELA subtypes across the first 4 years of life, cognitive and affective empathy at age 8, and prosocial behavior at age 17, beyond the influence of youth's assigned sex, ethnicity-race, and prior prosocial behavior at age 8. Consistent with deficit-based models of adversity, relational ELA was associated with lower levels of affective empathy, and affective empathy was associated with less prosocial behavior. Conversely, consistent with strength-based models of adversity, biological ELA was associated with higher affective empathy, which, in turn, was associated with increased prosocial behavior. Neither environmental ELA nor cognitive empathy was significantly related to prosocial behavior. These findings illuminate distinct developmental

TABLE 1 | Descriptive statistics and bivariate correlations among study variables ($N = 250$).

Variable	<i>M</i> (<i>SD</i>)	1	2	3	4	5	6
1. Relational ELA (prenatal-age 4)	< 0.001 (0.37)	—					
2. Environmental ELA (prenatal-age 4)	< -0.001 (0.46)	0.381**	—				
3. Biological ELA (prenatal-age 4)	0.01 (0.47)	0.323***	0.165**	—			
4. Cognitive empathy (age 8)	5.66 (1.19)	-0.166*	0.043	0.069	—		
5. Affective empathy (age 8)	4.39 (1.17)	-0.122	-0.165*	0.118	0.356***	—	
6. Childhood prosocial behavior (age 8)	3.85 (0.73)	-0.180*	-0.132	-0.228**	0.048	0.096	—
7. Adolescent prosocial behavior (age 17)	15.45 (61.34)	-0.169*	-0.134 [†]	-0.095	0.072	0.305***	0.129

Abbreviations: ELA, early life adversity; *M*, mean; *SD*, standard deviation.

[†] $p < 0.10$; * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$.

TABLE 2 | Indirect effects of relational, environmental, and biological ELA on youth's prosocial behavior through childhood cognitive and affective empathy ($N = 250$).

Effect	<i>b</i>	β	SE	<i>z</i>	<i>p</i> -value	95% CI
Covariates						
Youth sex (female = 1)	−0.25	−0.13	0.15	−1.69	0.09	[−0.54, 0.04]
Youth ethnicity-race (Latine = 1)	0.23	0.11	0.15	1.54	0.12	[−0.06, 0.51]
Childhood prosocial behavior	0.21	0.15	0.13	1.63	0.10	[−0.04, 0.46]
Predictors						
Relational ELA → Cognitive empathy	−0.53	−0.17	0.31	−1.72	0.09	[−1.14, 0.08]
Relational ELA → Affective empathy	−0.65	−0.21	0.28	−2.30	0.02	[−1.21, −0.10]
Environmental ELA → Cognitive empathy	−0.004	−0.001	0.22	−0.02	0.99	[−0.44, 0.43]
Environmental ELA → Affective empathy	−0.29	−0.12	0.20	−1.45	0.15	[−0.69, 0.10]
Biological ELA → Cognitive empathy	−0.09	−0.03	0.21	−0.40	0.69	[−0.50, 0.33]
Biological ELA → Affective empathy	0.53	0.21	0.20	2.73	0.01	[0.15, 0.92]
Cognitive empathy → Adolescent prosocial behavior	−0.09	−0.11	0.08	−1.18	0.23	[−0.24, 0.06]
Affective empathy → Adolescent prosocial behavior	0.32	0.38	0.08	3.84	< 0.001	[0.16, 0.48]
Direct effect						
Relational ELA → Adolescent prosocial behavior	−0.07	−0.03	0.23	−0.32	0.75	[−0.52, 0.38]
Environmental ELA → Adolescent prosocial behavior	−0.08	−0.04	0.18	−0.42	0.67	[−0.43, 0.28]
Biological ELA → Adolescent prosocial behavior	−0.20	−0.10	0.17	−1.19	0.24	[−0.53, 0.13]
Indirect effects						
Relational ELA → Cognitive empathy → Adolescent prosocial behavior	0.05	0.02	0.05	0.98	0.33	[−0.05, 0.15]
Relational ELA → Affective empathy → Adolescent prosocial behavior	−0.21	−0.08	0.11	−1.97	0.049	[−0.417, −0.001]
Environmental ELA → Cognitive empathy → Adolescent prosocial behavior	< 0.01	< 0.01	0.02	0.02	0.99	[−0.04, 0.04]
Environmental ELA → Affective empathy → Adolescent prosocial behavior	−0.09	−0.04	0.07	−1.38	0.17	[−0.23, 0.04]
Biological ELA → Cognitive empathy → Adolescent prosocial behavior	0.01	< 0.01	0.02	0.38	0.71	[−0.03, 0.05]
Biological ELA → Affective empathy → Adolescent prosocial behavior	0.17	0.08	0.08	2.21	0.03	[0.02, 0.32]
Total R^2				0.148		
Cohen's f^2				0.174		

Abbreviations: *b*, unstandardized estimate; CI, confidence interval; ELA, early life adversity; β , standardized estimate; SE, standard error.

pathways toward prosocial behavior during adolescence among adversity-exposed youth as a function of both ELA subtypes and empathy dimensions.

Corroborating deficit-based frameworks of ELA (Evans et al. 2013; McLaughlin et al. 2014) and prior mediation findings in maltreatment contexts (Chen et al. 2023; Yu et al. 2020), relational ELA was associated with lower levels of prosocial behavior in adolescence through lower levels of childhood affective empathy. These findings suggest that relational ELA may undermine youth's ability to understand others' distress and subsequent engagement in prosocial behavior. Youth with stressful, and potentially traumatic, exposure to adverse exchanges in the immediate family, which feature prominently in relational ELA, may lack empathic role models and requisite experiences of successful co-regulation to develop their capacities to respond effectively to their own or others' distress

(Gobodo-Madikizela 2008). Efforts to enhance affective empathy skills may buffer youth from the negative effects of relational ELA on prosocial behavior.

Aligning with Vollhardt's (2009) altruism born of suffering theory and research in adult populations (Lim and DeSteno 2016), this study documented an indirect pathway from biological ELA to increased prosocial behavior in adolescence via higher levels of affective empathy. Although replication will be important given the novelty of this investigation, this finding may reflect a strength-based process whereby biological ELA evokes risk-activated protective responses from parents (Masten 2018). Specifically, early biological vulnerabilities (e.g., childhood health risks) may elicit heightened parental involvement and sensitive parenting, which may foster empathy and thereby nurture prosocial behavior. Indeed, prior research suggests that caring for children with chronic illnesses is associated with increased

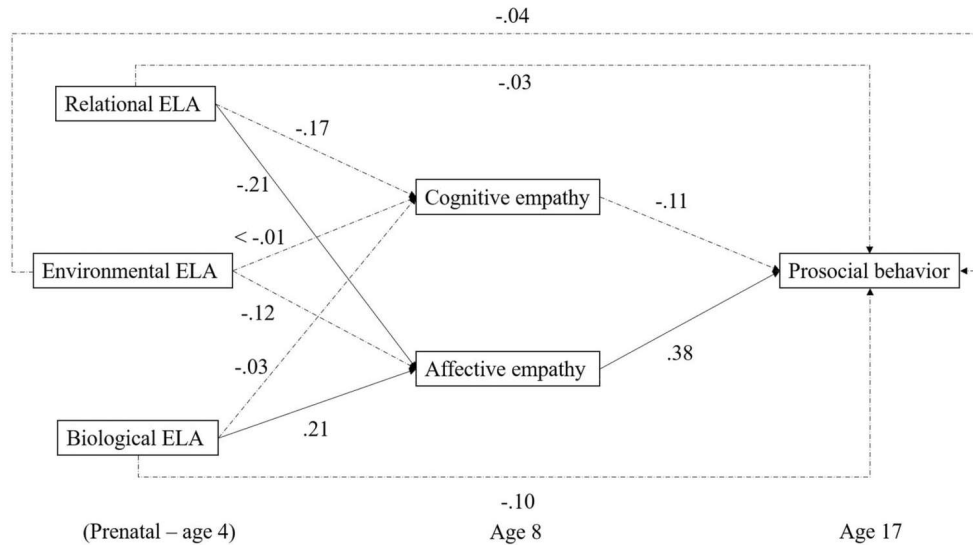


FIGURE 1 | Mediation model of relational, environmental, and biological ELA on youth's prosocial behavior via childhood cognitive and affective empathy. Estimates are standardized regression coefficients. Covariates include youth's sex assigned at birth, ethnicity-race, and prosocial behavior at age 8. Solid line = significant path; dotted line = non-significant path.

parental involvement and caregiving engagement in parent-child interactions (Turner-Henson et al. 1992). In turn, sensitive and attuned parenting has shown positive associations with children's empathy development and prosocial behavior (e.g., Feldman 2007; Soenens et al. 2007). Taken together, these findings suggest that biological ELA may indirectly enhance positive socioemotional development through reciprocal child effects on parenting behavior. Future studies exploring parenting and socialization as risk-activated protective processes in pathways from biological ELA to empathy and prosocial behavior will clarify these relations.

Surprisingly, we found no significant relations among environmental ELA, empathy, and prosocial behavior. Although these findings warrant replication since this was the first longitudinal study to examine these pathways, they may reflect attenuation effects due to the indirect nature of environmental ELA influences on children's social development and/or the analytic model used here. First, these null findings may, in part, reflect differences in the proximal effects of distinct ELA subtypes on children's socioemotional development, such that relational ELA (e.g., family violence, parental psychopathology) encompasses caregiving disturbances that may directly influence children's attachment and social learning processes (Morris et al. 2007), whereas environmental ELA (e.g., economic hardship, residential mobility) may be less directly embedded in daily parent-child interactions yielding indirect effects on children's socioemotional development through caregiver strain and stress (Conger et al. 1992; Conger and Donnellan 2007). Moreover, environmental stressors may be more amenable to compensatory relational processes, such that supportive caregiving may buffer their negative effects on children's development in ways that are less likely in contexts of relational ELA. Indeed, given that relational ELA was included in the same analytic model, pathways from environmental ELA to prosocial behavior through empathy may have been attenuated precisely because stress-related caregiving disruptions were held constant. Future research should explicitly assess parenting and socialization mechanisms to clarify how various forms of ELA may influence empathy and prosocial development.

The current findings highlight affective empathy, but not cognitive empathy, as a key mechanism underlying prospective associations between ELA subtypes and adolescents' prosocial behavior. The apparent salience of affective empathy in these pathways is consistent with prior results found in adults (Lim and DeSteno 2016) and suggests that the experience of sharing and resonating with others' negative feelings, rather than recognizing others' emotional states, motivates prosocial behavior. Indeed, across six waves of data, Van der Graaff et al. 2018 found that empathic concern (i.e., affective empathy), but not perspective taking (i.e., cognitive empathy), directly predicted subsequent prosocial behavior. The current study underscores the significance of affective empathy in pathways to prosocial behavior and the likely value of interventions to support affective empathy development among adversity-exposed youth.

4.1 | Strengths and Limitations

This investigation filled gaps in the literature by testing competing models of expected relations between ELA subtypes and prosocial behavior via intervening measures of cognitive and affective empathy from childhood to adolescence. Despite strengths conferred by using multiple methods and informants with a sociodemographically diverse sample of parents and youth followed over time, several limitations qualify the obtained findings while highlighting promising future directions.

First, although the longitudinal design supported prospective associations, prior measures of empathy during early childhood were unavailable in this study. Holding prior levels of the mediators constant would have prevented over- or underestimating observed relations (Selig and Preacher 2009). Moreover, repeated measures of all study variables would support a more comprehensive evaluation of growth in these dynamically changing processes across childhood and adolescence, especially for empathy (e.g., Eisenberg et al. 2015). Future research should replicate these results while controlling for empathy at previous time points.

Second, although the GEM (Dadds et al. 2008) is a widely used measure of childhood empathy using parent ratings, the cognitive empathy subscale shows modest reliability in prior research (e.g., 0.49 to 0.57 in Kimonis et al. 2016; see also Dadds et al. 2008) and in this study. It may be more difficult for parents to report on cognitive empathy because it is entirely internal to the child and develops later than affective empathy (Hoffman 1979). The modest reliability of the cognitive empathy subscale may have attenuated obtained associations and contributed to the null findings for cognitive empathy observed in the present study. This recurring reliability issue speaks to the need to develop psychometrically-sound parent-rated assessments of childhood cognitive empathy.

Third, notwithstanding the value of using a behavioral prosocial assessment in this study, the computer-based Dictator Game offered a narrow view of children's prosocial behavior. Although this study examined prosocial behavior as resource allocation, akin to donation decisions in real-life settings (Thielmann et al. 2020), using other approaches to measure donation behavior (e.g., observational assessments) would strengthen future research. Likewise, other aspects of prosocial behavior should also be considered, particularly given the well-established role of empathy in promoting helping and comforting behaviors (Dunfield 2014).

Fourth, we examined ELA subtypes, rather than individual ELA events, which prevented us from examining whether specific adversities within each subtype would show differential associations with cognitive or affective empathy, as well as with prosocial behavior. Notwithstanding this limitation, the current approach is consistent with cumulative and dimensional models of adversity that emphasize how shared characteristics across adverse experiences within subtypes (e.g., threat, deprivation, relational disruption) may be developmentally meaningful beyond the effects of isolated ELA events (e.g., Evans et al. 2013; McLaughlin et al. 2014). Moreover, single event models in a sample of this size would suffer from limited power due to low base rates for some individual ELA events (e.g., parental death) and limited variability. In future research with larger samples, it will be important to explore the potential for heterogeneous effects across individual adversities within each subtype, which may have attenuated some observed associations between ELA subtypes and empathy and prosocial development in this study.

Finally, for analytic purposes and due to sample size considerations, ethnicity-race was dichotomized as Latine versus non-Latine, which fails to capture the complexity of youth's ethnic-racial identities and experiences. For instance, youth who were identified as multiracial were coded as non-Latine, unless Latine ethnicity-race was reported, to prevent misclassification. Although this approach is consistent with prior developmental research relying explicitly on self- or parent-identification of ethnicity-race (Ford & Harawa, 2010), it limited our ability to examine within-group variability and intersectional identity experiences. In addition, given that socioemotional processes are shaped by cultural socialization practices (Bornstein 2015; Eisenberg et al. 2015), this dichotomized categorization of ethnicity-race likely obscured meaningful variations across ethnic-racial groups and served as a coarse proxy for more nuanced cultural processes (e.g., collectivistic vs. individualistic cultural values; Chopik et al. 2016). Future work should

consider more nuanced approaches to assessing cultural processes and employ samples with large ethnic-racial subgroups to clarify potential cultural variations in these pathways.

4.2 | Implications

This investigation extends prior theory and research by highlighting affective empathy as an important intervening variable in prospective associations from relational and biological ELA to lower and higher levels of adolescents' prosocial behavior, respectively. These findings provided empirical evidence for both deficit- and strength-based perspectives on ELA effects (e.g., Evans et al. 2013; McLaughlin et al. 2014; Tedeschi and Calhoun 2004; Vollhardt 2009) while encouraging ongoing efforts to consider specific dimensions of ELA and empathy in relation to prosocial behavior.

The current findings also inform applied efforts by identifying affective empathic skills as a promising target for interventions among adversity-exposed youth. Affective empathy training focuses on strengthening youths' emotional responsiveness to others, including recognizing others' emotions, validating others' feelings, and engaging in activities that promote empathic concern (e.g., role play, guided reflection, and emotion-focused discussions; Van Noorden et al. 2015; Malti et al. 2016). While prior interventions have targeted both cognitive and affective components of empathy to support social and academic outcomes (Malti et al. 2016), emerging evidence suggests that affective empathy may be particularly responsive to intervention. For example, a school-based anti-bullying program incorporating empathy-related elements (e.g., interpreting nonverbal emotional cues, engaging with others' emotional experiences, and reflecting on the impact of harmful behavior) increased students' affective empathy over time, but not their cognitive empathy (Garandeau et al. 2022). Nevertheless, additional research is needed to clarify how this and other programs may support (or be tailored for) youth with a history of ELA.

In addition to child-focused approaches, parenting practices (e.g., sensitive parenting, emotional socialization) play important roles in shaping youth's representations of themselves and others, as well as their capacities to regulate and express emotions, in ways that may enhance empathy development (Spinrad and Gal 2018) and promote prosocial behavior (Eisenberg et al. 2015). Therefore, integrating family-based programs with child-focused empathy training may be especially beneficial for promoting affective empathy and prosocial development among adversity-exposed youth.

Author Contributions

Duyen T. Trang: conceptualization, writing – original draft, writing – review and editing, formal analysis. **Stacey N. Doan:** funding acquisition, writing – review and editing. **Brianne R. Coulombe:** writing – review and editing. **Tuppert M. Yates:** funding acquisition, supervision, writing – review and editing.

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Conflicts of Interest

The authors declare no conflicts of interest.

Data Availability Statement

The data that support the findings of this study are available from the corresponding author upon reasonable request.

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