Affective Science
https://doi.org/10.1007/s42761-024-00280-y

RESEARCH ARTICLE

Exploring the Role of Empathy in the Association Between Early Life Adversity and Antisocial Behavior

Isabella Kahhale[1,2] · Kelly R. Barry[3] · Desmond C. Ong[4] · Jamil Zaki[5] · Jamie L. Hanson[1,2]

Received: 20 July 2023 / Accepted: 11 September 2024

Abstract

Early life adversity (ELA) refers to stressful childhood experiences such as neglect, abuse, and violence exposure that can profoundly shape behavior. While ELA is consistently linked to antisocial behavior (e.g., aggression, delinquency), the role of empathy in this connection is unclear. Empathy, the ability to understand and resonate with others' thoughts and emotions, is theoretically linked to antisocial behavior, but empirical work has produced mixed findings. We explore mediation and moderation frameworks to explain the ELA-antisociality link. Using an online sample of 165 adults, we examine three ELA dimensions (unpredictability, threat, and deprivation) and their association with antisocial behavior and empathy through an ecologically valid empathic accuracy task. We also compare this naturalistic measure of empathy with a popular self-report measure of empathy. Results did not support mediation with either operationalization of empathy (i.e., task or self-report), with no direct effects of ELA on empathy or of empathy on antisocial behavior. Empathic accuracy, however, moderated the association between antisocial behavior and both unpredictability and deprivation in childhood. At low levels of empathic accuracy, there was a significant link between adversity and antisocial behavior (unpredictability $\beta = 0.38$, $p < 0.001$, deprivation $\beta = 0.41$, $p < 0.001$). Empathic accuracy did not moderate an association between threat adversity and antisocial behavior. Notably, across all moderation models, associations were non-significant when the self-report measure of empathy was used. Findings suggest that empathy skills protect against antisocial behavior in the context of unpredictability and deprivation, highlighting the importance of considering dimensions of ELA and ecologically valid, naturalistic empathy measures. Understanding how variations in empathic abilities within ELA dimensions influence antisocial behavior has implications for targeted interventions and promoting emotional well-being in individuals exposed to adversity.

Keywords Early life adversity · Empathy · Empathic accuracy · Threat · Deprivation · Unpredictability

Early life adversity (ELA) describes common stressful childhood experiences including neglect, physical abuse, and neighborhood violence exposure (Polanco-Roman et al., 2021; Wade et al., 2022). ELA is an antecedent to an array of socioemotional problems in adulthood such as poor social relationships (Lansford et al., 2002) and psychopathology (Hanson et al., 2015) including antisocial behavior, which confers a high personal, societal, and financial cost (Braga et al., 2018). While connections between ELA and antisociality have been consistently replicated, exactly how ELA cascades to adult antisocial behavior remains unclear. Empathy may be a causal mechanism, or salient risk factor, linking ELA and antisocial behavior, as it is a key skill for interpersonal bonds, prosocial actions, and emotional well-being (Morelli et al., 2015). However, many open questions exist related to the role of empathy within this well-established link between ELA and antisocial behavior. Some literature points to empathy's role as a mediator in this connection, suggesting that altered empathy is a pathway through which

Handling Editor: Eric A Walle.

✉ Isabella Kahhale
Isabella.kahhale@pitt.edu

1 Department of Psychology, University of Pittsburgh, Pittsburgh, PA, USA

2 Learning, Research, & Development Center, University of Pittsburgh, Pittsburgh, PA, USA

3 Department of Psychology, University of Houston, Houston, TX, USA

4 Department of Psychology, University of Texas at Austin, Austin, TX, USA

5 Department of Psychology, Stanford University, Stanford, CA, USA

Published online: 02 October 2024

ELA cascades to antisocial behavior. Other work implies that empathy is a moderator in the link between ELA and antisocial behavior, such that high empathy skills are *protective*, or low empathy skills are a *risk*, for antisocial behavior following ELA exposure. Yet, competing mediation versus moderation frameworks have never been empirically tested independently or together. A fuller understanding of the associations between ELA, empathy, and antisocial behavior could provide insights into the impact of ELA on socioemotional functioning and guide psychosocial interventions aimed at preventing maladaptive behavior.

Experiences of ELA are ubiquitous and prevalent, with studies suggesting that > 40% of adults have been exposed to some form of childhood adversity both in the United States and internationally (Bethell et al., 2017; Kessler et al., 2010). Antisocial behavior describes actions likely to cause harm to others and violate social norms such as aggression, delinquency, and violence (Braga et al., 2018; Burt, 2012) and is one of the most well-replicated and impactful outcomes of the many maladaptive consequences associated with ELA. A meta-analysis on longitudinal studies of childhood maltreatment and antisocial behavior demonstrated that, across over 20,000 individuals, those who were maltreated as children were nearly twice as likely to engage in antisocial behavior as adults compared to those who were not maltreated (Braga et al., 2018). Work has established increased risk of antisocial behavior (e.g., aggression, violent, and nonviolent offenses) for various types of ELA including exposure to physical abuse (Lansford et al., 2007), harsh parenting, neighborhood deprivation (Gard et al., 2017), family conflict, child medical problems, financial instability (Mackey et al., 2017; Yazgan et al., 2021), and other adverse life events. Given this strong link between ELA and antisocial behavior, it is of interest to clinicians, parents, policymakers, and others to understand *how* exactly ELA cascades to such behavior.

Empathy, or the capacity to understand and resonate with others' thoughts, perspectives, and emotions (Decety & Meyer, 2008), may be one skill that helps explain how experiences of ELA associate with antisociality. Empathy is theoretically and empirically linked to antisocial behavior; for example, decreased empathy has been associated with various aspects of antisocial behavior such as aggression, violence, criminal delinquency, and psychopathy (Blair, 2005, 2018; Eisenberg & Miller, 1987). Low empathy is a diagnostic marker of Conduct Disorder with "Limited Prosocial Emotions" reflecting the presence of callous-unemotional (CU) traits (American Psychiatric Association, 2013). Further, empathy-boosting interventions are a common feature of treatment for antisocial behaviors across a variety of settings and populations (Vachon et al., 2014; Van Der Stouwe et al., 2018), including in correctional settings (Marshall, 1999; Serin & Kuriychuk, 1994), violence prevention programs for elementary school children (Grossman et al., 1997), and anger management courses for adolescents (Goldstein et al., 1998; Pecukonis, 1990).

However, upon close examination, empirical work connecting individual differences in empathy and antisocial behavior tells a muddled story. Less empathy is not always correlated with more antisocial behavior, or vice versa, across the heterogeneous construct that is antisocial behavior (Anderson & Bushman, 2002; Burt, 2012). Many studies find positive, negative, and null associations between aggression, a main component of antisocial behavior, and empathy (Kahhale et al., 2024; Raine & Chen, 2018; Raine et al., 2022). In fact, multiple studies have found that *increased* empathy is related to *increases* in certain types of aggression (Chen et al., 2021; Palumbo & Latzman, 2021; Raine et al., 2022). In addition, some evidence suggests that empathy interventions are not effective in reducing recidivism, sexual violence, or aggression (Day et al., 2010; Hanson & Morton-Bourgon, 2019) despite the key role that empathy trainings play in the treatment of antisocial behavior across various settings. Not only is it poorly understood specifically how empathy relates to antisocial behavior, but it also remains unknown how empathy relates to antisocial behavior *in the context of ELA*. Is empathy a pathway through which ELA predicts antisocial behavior, or do variations in empathy help us understand when relations between ELA and antisocial behavior are stronger?

Literature linking ELA and empathy provides initial motivation for exploring ELA, empathy, and antisocial behavior together, though this work has also produced inconsistent results. Previous research has found that ELA impacts the same skills underpinning one's ability to empathize, including emotion regulation and executive functioning skills such as self-control, working memory, and cognitive flexibility (McLaughlin & Sheridan, 2016). These skills support accurate interpersonal understanding by regulating emotions to help someone react to the emotions of another person and integrating together verbal and nonverbal cues (Decety & Meyer, 2008; Zaki et al., 2009). Despite this theoretical and empirical basis suggesting empathy would be significantly associated with ELA, the limited research exploring ELA and empathy has produced mixed findings.

On the one hand, some studies have found that experiences of ELA are associated with *increased* empathy. "Altruism born of suffering" postulates that, following adversity exposure, many individuals increase their altruistic tendencies via perceived identification with other victims and a greater sense of responsibility to prevent suffering (Staub & Vollhardt, 2008; Vollhardt, 2009). Across multiple studies, researchers found that participants who suffered more childhood adversity had higher trait empathy and spent more time helping a confederate in need (Lim & DeSteno, 2016). At the same time, other researchers have connected childhood

adversity to *decreased* levels of empathy via increased personal distress or diminished responsivity to negative emotional signals (Fourie et al., 2019; Levy et al., 2019; Locher et al., 2014). Prior work has implicated adjacent constructs to empathy, such as emotional reactivity and emotional dysregulation, as links between ELA and antisocial behavior (van Goozen, 2015). For example, a longitudinal study found that harsh parenting and neighborhood deprivation were associated with altered amygdala reactivity to fearful facial expressions, which in turn predicted antisocial behavior (Gard et al., 2017). While this work provides initial motivation for the role of socioemotional skills in connecting ELA and antisocial behavior, it remains unclear how empathy specifically connects ELA and adult antisocial behavior together.

At least three theoretical and methodological limitations may be contributing to the lack of clarity on these associations. First, literature has modeled empathy as both a mediator and a moderator within the ELA-antisociality link, with no work directly comparing the two approaches. Experiences of ELA may alter empathy, which in turn becomes a pathway through which adversity-exposed individuals engage in more antisocial behavior. Consistent with this, adjacent processes such as social information processing have been proposed as transdiagnostic mechanisms between ELA and aggression (Dodge, 2011). Further, empathic skills have been causally implicated in the connection between environmental experiences (i.e., parenting styles) and antisociality (Schaffer et al., 2009). This empirical work established empathy as a mediator between *parenting* and antisocial behavior but did not explore experiences of early life adversity directly. There is a gap in the literature where, to our knowledge, no work has formally tested a mediation model between ELA, empathy, and antisocial behavior.

Theoretical and empirical works also describe empathy as a potential moderator of antisocial behavior. Research among multiple youth samples has found that greater emotional responsivity to peers is protective against antisocial behavior (Dallaire & Zeman, 2013; De Kemp et al., 2007). Among adults, empathy is a defining feature distinguishing between less and more extreme forms of antisociality (i.e., psychopathy), suggesting that impaired empathy may be a risk factor for severe antisocial behavior rather than a prerequisite (Viding et al., 2014). However, as in the case of a mediation framework, no work has explicitly tested empathy as a moderator between ELA and adult antisocial behavior.

A second limitation giving rise to variable associations between ELA and empathy may be the measurement and conceptualization of empathy. Empathy is a complex skill that is often measured via self-report questionnaires such as the Interpersonal Reactivity Index (IRI; Davis, 1980). Employing more naturalistic operationalizations may be one way to improve our measurement of empathy. One such measure of empathy is the Empathic Accuracy task, a paradigm that charts second-by-second perceptual judgments of a storyteller's feelings as they discuss their experiences (Ickes et al., 1990; Levenson & Ruef, 1992; Zaki et al., 2008). The empathic accuracy task has been traditionally conceptualized as a measure of cognitive empathy (i.e., *knowing* how someone else feels). The limited work extending the study of empathic accuracy to psychopathology and environmental experiences has found that empathic accuracy (measured via other questionnaire- and task-based measures) is negatively associated with severe antisocial behavior (Brook & Kosson, 2013) and childhood emotional abuse and neglect (Maneta et al., 2015; Zhang et al., 2022). Following these approaches and adopting more empathy measures that more accurately model the complexity of this behavior could improve measurement accuracy within the ELA-empathy-antisociality connection.

A third limitation to previous studies that this work seeks to overcome is that ELA is complex to operationalize. Traditional approaches to understanding ELA have considered *specific adversities* (e.g., war trauma) or cumulative risk scores representing tallies of adverse experiences (Evans et al., 2013). These approaches ignore other influential adversities in someone's life or combine across heterogenous experiences, losing purchase on what is contributing to a particular outcome (Ellis et al., 2022). Recent approaches fill these gaps by emphasizing underlying *dimensions of* adversity to examine shared and defining features of experiences. These dimensions include random changes to the environment (i.e., *unpredictability*), the absence of expected environmental inputs (i.e., *deprivation*), and the presence or threat of harm (i.e., *threat*) (Wade et al., 2022). Unpredictability (e.g., inconsistent discipline), *threat* (e.g., physical abuse), and *deprivation* (e.g., lack of parental involvement) have been found to give rise to distinct patterns of brain and behavioral challenges that may differentially associate with empathy (Ellis et al., 2009; McLaughlin & Sheridan, 2016). For example, children who experience unpredictability and deprivation are at greater risk for executive function deficits through the absence of complex cognitive inputs (McLaughlin, Sheridan & Lambert, 2014; McLaughlin, Sheridan, Winter et al., 2014), while children exposed to more threat will often show atypical processing of emotional information through alterations in emotional regulation pathways (Miller et al., 2018). A *dimensional* perspective of ELA has not been applied to understand associations between ELA and empathy and can potentially clarify what aspects of ELA connect to empathy and antisocial behavior.

The present study seeks to fill theoretical and methodological gaps by exploring how dimensions of ELA might associate with empathy and antisocial behavior. We contrasted a naturalistic measure of empathy with a traditional, self-report measure of this construct and explored our

hypotheses in a sample of adults recruited online. We first considered that empathy, modeled as both a task and a self-report measure, might be a *mediating* link between ELA and antisocial behavior. We next considered that empathy, again modeled via task and self-report, would *moderate* the association between dimensions of ELA and antisociality. Within these competing frameworks, we investigated three dimensions of ELA: unpredictability, threat, and deprivation. A nuanced and updated view of ELA has not been applied to explore the ways in which adversity dimensions might associate within empathy to cascade to antisocial behavior.

Dimensions of adversity likely relate differently to components of empathy based on deficits associated with each dimension. The Empathic Accuracy Task output (i.e., asking participants to rate how they think a storyteller is feeling) is traditionally conceptualized as relying on cognitive processes (Ickes et al., 1990; Zaki et al., 2008). Cognitive underpinnings of empathy include theory of mind, working memory, and executive functioning skills (Gao et al., 2016; Yan et al., 2020). Distinct cognitive deficits in these abilities have been associated with a lack of consistent environmental inputs that are more commonly features of unpredictability and deprivation adversity (Ellis et al., 2022). Accordingly, we hypothesized that the dimensions of unpredictability and deprivation would be more strongly associated with the Empathic Accuracy Task in the context of adult antisocial behavior compared to the dimension of threat. Multiple studies have established unique correlates between deprivation and specific underpinnings of cognitive empathy, such as theory of mind (Tarullo et al., 2007; Yagmurlu et al., 2005), working memory (Beckett et al., 2010), and executive functioning (Bos et al., 2009). The construct of unpredictability tends to overlap conceptually and in practice with deprivation (e.g., many studies measure both constructs via different facets of socioeconomic disadvantage) (Wade et al., 2022). Individual and meta-analytic studies have found associations between unpredictable experiences in childhood and many of the same cognitive skills that support empathic accuracy such as executive functioning (Andrews et al., 2021; Davis et al., 2019).

While dimensions of adversity frequently co-occur (Smith & Pollak, 2021), studies that have attempted to disentangle threat and deprivation observe changes in cognitive functioning among those exposed to deprivation more consistently compared to those exposed to threat (Johnson et al., 2021; McLaughlin, 2018; Wade et al., 2022). In work examining multiple dimensions, authors found that deprivation, after controlling for threat, was associated with lower global executive functioning skills. Threat, after controlling for deprivation, was not related to executive functioning skills (Sheridan et al., 2017). We, therefore, did not expect threat to be as strongly related to the Empathic Accuracy task.

Method

Participants

We recruited 165 adult participants from an online research registry and applied rigorous exclusion checks for a final $N = 124$ (see Supplement for power analysis and exclusion criteria). Forty-nine percent of the total sample was recruited from the general Prolific pool, and 51% was recruited from a pool of people who identified as being at a 5 or below on the MacArthur Scale of Subjective Social Status (0 = lowest rung, 10 = highest rung; Adler et al., 1994). This was done to over-sample for adversity exposure due to connections between ELA and lower socioeconomic status (Jaffee et al., 2018).

Procedure

The University of Pittsburgh Institutional Review Board granted approval for this project. A link to the study was posted on an online recruitment registry (i.e., Prolific) to test a diverse sample of adult participants. Participants completed well-validated measures of early life adversity, empathy, and other psychological characteristics via a Qualtrics survey. After completing questionnaires, participants were redirected to the online platform Pavlovia to complete two tasks (the Digit Span Task and the Empathic Accuracy Task).

Measures

Demographics Various demographic characteristics were collected via self-report, including biological sex, race, income, education level, and current employment status (see Table 1).

Dimensions of ELA The dimension of Unpredictability was measured via the Unpredictability Subscale of The Questionnaire of Unpredictability in Childhood (*QUIC*; Glynn et al., 2019). The QUIC is a 38-item questionnaire that retrospectively assesses experiences of caregiving, punishment, and environmental instability before the age of 18 years old (and in some cases, 12 years old). Validation studies demonstrated excellent internal reliability ($\alpha = .89$) and test–retest reliability of this measure ($r = .92$) (Glynn et al., 2019). Due to our interest in parenting dynamics involving the participant when they were children, we specifically used the Parental Predictability subscale which comprised 12 items assessing predictability in caregiving and punishment practices. Example items include "At least one of my parents had punishments that were unpredictable," "I often wondered

Table 1 Descriptive statistics for key variables

Characteristic	$N = 124$[a]
Age (years)	36 (13)
Sex	
Man	43 (35%)
Woman	79 (64%)
Prefer not to answer	2 (1.6%)
Race	
Asian	4 (3.2%)
Black or African American	13 (10%)
White	87 (70%)
Biracial	14 (11%)
Other/prefer not to answer	3 (2.4%)
Ethnicity	
Hispanic	7 (5.6%)
Not Hispanic	117 (94%)
Education level	
Less than or some high school	3 (2.4%)
High School Diploma/GED	16 (13%)
Some college, no degree yet	33 (27%)
Associate's Degree	12 (9.7%)
Bachelor's Degree	38 (31%)
Master's Degree	15 (12%)
MD, Ph.D., other advanced degree	2 (1.6%)
Other	5 (4%)
Income	
$0 to $9,999	7 (5.6%)
$10,000 to $19,999	14 (11.3%)
$20,000 to $39,999	20 (16.8%)
$40,000 to $49,999	11 (8.9%)
$50,000 to $59,999	13 (10%)
$60,000 to $69,999	13 (10%)
$70,000 to $79,999	9 (7.3%)
$80,000 to $99,999	4 (3.2%)
$100,000 to $149,999	18 (15.4%)
$150,000 to $199,999	6 (4.8%)
$200,000 +	2 (1.6%)
Prefer not to answer	3 (2.4%)
Employment status	
Working now in formal work	60 (48%)
Working now in informal work	15 (12%)
Looking for work/unemployed	14 (11%)
Retired	1 (0.8%)
Disabled	9 (7.3%)
Homemaker	7 (5.6%)
Student	11 (8.9%)
Other/prefer not to answer	7 (5.6%)
Self-Report Empathy (IRI)	54 (12)
Unpredictability (QUIC)	5 (3)
Threat (MAES)	18 (12)
Deprivation (MAES)	5.7 (5.7)
Antisocial behavior (SRDS)	3.4 (4.6)

IRI Interpersonal Reactivity Index, *QUIC* Questionnaire of Unpredictability in Childhood, *MAES* Maltreatment Abuse and Exposure Scale, *SRDS* Self-Report of Delinquency Scale.

[a]Mean (*SD*); *n* (%).

whether or not one of my parents would come home at the end of the day," and "One of my parents could go from calm to furious in an instant."

The dimensions of Deprivation and Threat were measured via the *Maltreatment Abuse and Exposure Scale (MAES*; Teicher & Parigger, 2015). The MAES is a 52-item scale that assessing exposure to abuse, maltreatment, and other negative experiences through "Yes" or "No" answer choices. The MAES shows good psychometric properties and has been validated cross-culturally (Kluwe-Schiavon et al., 2016; Teicher & Parigger, 2015). The Threat score was derived by summing across sexual abuse, verbal abuse, non-verbal emotional abuse, peer emotional abuse, and peer physical abuse items. Example Threat items include "Swore at you, called you names, said insulting things like you are 'fat', 'ugly', 'stupid', etc. more than a few times a year" and "Intentionally pushed, grabbed, shoved, slapped, pinched, punched or kicked you." The dimension of deprivation was derived from MAES items assessing physical maltreatment, emotional neglect, and physical neglect. Example deprivation items include "You felt that your parent was present in the household but emotionally unavailable to you for a variety of reasons like drugs, alcohol, workaholic, having an affair, heedlessly pursuing their own goals" and "You didn't have enough to eat."

Adult Antisocial Behavior The Self-Report of Delinquency Scale (SRDS), a measure adapted from the National Youth Survey Antisocial Measure (Elliott et al., 1985), is widely used to study antisocial behavior (Cho et al., 2010). The SRDS measures the frequency with which individuals have engaged in antisocial behaviors such as stealing, cheating, and assault in the past year (1 = Never; 2 = Once or twice; 3 = More often). This study used the general delinquency score which has a test–retest reliability of $r = .84$ (Huizinga & Elliott, 1986). Example items include "have you bullied, threatened, or intimidated someone else?" and "Have you snatched someone's purse or wallet or picked someone's pocket?".

Task-Based Measure of Empathy Participants' ability to accurately empathize was measured via the Empathic Accuracy task (Ickes et al., 1990; Zaki et al., 2008), a naturalistic and ecologically valid measure of empathy (Dziobek, 2012). The task requires participants to watch and listen to eight short video clips (approximately 2 min each) of individuals telling stories about their lives (see Fig. 1). These video clips are part of a corpus of videos called the Stanford Emotional Narratives Dataset (Ong et al., 2021). The larger corpus of videos was compiled by screening for sensitive content for the purpose of showing the video stimuli online and have been used in other online and in-person studies (for further details, please see Ong et al., 2021). Participants were asked

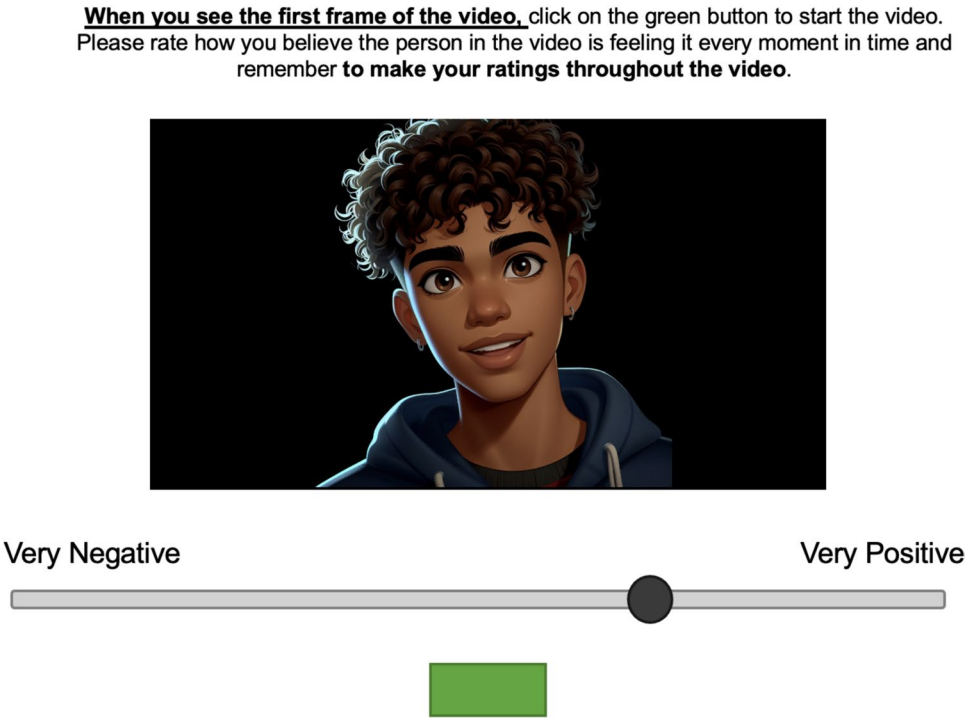

Fig. 1 Paradigm used to collect observer ratings. Observers used a visual analog scale from "Very Negative" to "Very Positive" and dragged the slider as the video was playing to rate the target's valence. Videos captured targets' faces and shoulders against a clean, black backdrop. Figure inspired by Ong et al., 2021. Cartoon derived from Bing.com Image Generator

to continuously rate how they think a storyteller was feeling as they told real stories about their lives. Participants make these ratings by sliding a bar across a scale labeled from 0 (very negative) to 100 (very positive). Participant's ratings are then correlated with the storyteller's own ratings (reflecting their experience while telling their stories) for an overall measure of empathic accuracy, which was then averaged across the eight study videos. After each of the eight videos, participants answered two True/False questions about the content of the story (i.e., 16 comprehension check questions total). Videos were counterbalanced for storyteller gender and valence (i.e., there were four positive stories and four negative stories) and were presented in a random order to each participant.

Self-Report Measure of Empathy A 21-item version of the Interpersonal Reactivity Index (IRI) (Davis, 1980) was used consisting of items assessing an individual's ability to perspective take (perspective taking subscale), sensitivity towards other's distress (personal distress subscale), and affective empathic concern (empathic concern subscale). Example items include: "I try to look at everybody's side of a disagreement before I make a decision" or "I am often quite touched by things that I see happen." Answer choices ranged on a 5-point scale, from 0 = "This statement does not describe me well" to 4 = "This statement describes me very well." A total self-report empathy score was created by summing responses across all items assessing perspective taking, personal distress, and empathic concern, with higher scores indicating greater empathy.

Cognitive Ability Previous work has shown that various dimensions of ELA are connected with cognitive deficits, including changes in language ability and executive functioning (Ellis et al., 2022). To rule out general cognitive ability as an explanation for any effects of ELA on the empathic accuracy task, we controlled for global cognitive functioning via a task-based measure of working memory. The Digit Span task is a widely used cognitive assessment that measures working memory and sustained attention (Ramsay & Reynolds, 1995). Computerized versions of the digit span task have shown good reliability and validity (Woods et al., 2011; Youngjohn et al., 1992). For the first portion of the task, participants were presented with a series of numbers, one at a time, and then asked to recall the numbers in the order they appeared (i.e., participant was shown 5–6-9, the correct response would be 5–6-9). If participants correctly entered in the sequence of numbers, on the next trial, the sequence of numbers increased by one. For the second part of the task, participants were asked to enter their response in the reverse order of how the numbers had been presented to them (i.e., participant was shown 1–4-6, the correct response would be 6–4-1). We calculated the maximum number of digits each participant correctly recalled during (a) forward digit span trials and (b) reverse digit span trials. As a separate validity check, we calculated standard deviations from the group mean forward and reverse digit span score for each participant and excluded participants who scored more than 2 standard deviations above the mean (i.e., such a score suggested participants may have been writing down digits during the task).

Analysis

Multiple linear regression models were conducted to explore the associations between three dimensions of early life adversity, empathy, and adult antisocial behavior within (A) a mediation framework and (B) a moderation framework. First, for each of the three dimensions of adversity (i.e., unpredictability, threat, and deprivation) within a mediation framework, we tested the hypothetical "a" path association between the dimensions of adversity and both empathy operationalizations (i.e., empathic accuracy task and total self-report empathy) and the "b" path association between both empathy operationalizations and antisocial behavior. To limit the number of tests we ran, we determined to run further mediation analyses only if the a and/or b paths were significant. To test for a moderation framework, we ran three linear regression models testing the moderating effect of both empathy operationalizations on the association between each of the three dimensions of ELA and antisocial behavior. Supplemental models considered mediation and moderation models with the three self-reported empathy subtypes (perspective taking, personal distress, and empathic concern) in the place of a total empathy score.

All models within the mediation and moderation frameworks considered as covariates biological sex, age, income, and general cognitive ability. All numeric variables (i.e., all analytic variables apart from biological sex) were *z*-scored. Estimates subsequently represent standardized beta values. Of note, all de-identified behavioral and task data, data cleaning files, and analysis files can be found on the study GitHub. Please see the Supplement for further details on data cleaning and exclusion criteria.

Results

See Table 1 for descriptive statistics for key study variables and demographics of our sample and Table 2 for bivariate correlations.

Empathy as an Indirect Effect Between Dimensions of ELA and Antisocial Behavior

To test if there was any association between ELA and our first operationalization of empathy, we ran statistical models between dimensions of ELA and empathic accuracy score (Table 3). There were no main effects of any dimensions of ELA on empathic accuracy score (unpredictability $\beta = -.10$, $p = .26$, threat $\beta = -.06$, $p = .54$, deprivation $\beta = -.11$, $p = .23$). Next, analyses between dimensions of ELA and self-reported empathy (Table 4) revealed there were also no main effects of any dimensions of ELA on IRI

Table 2 Correlations among key study variables

	Age	Sex	Race	Ethnicity	Edu	Income	Employ	Unpredict	Threat	Depriv	Empathy (IRI)	Emp Acc	Antisocial behavior
Age													
Sex	.12												
Race	.08	.18											
Ethnicity	−.09	.02	.21*										
Education	.14	−.08	−.02	−.04									
Income	−.10	.03	.08	.12	.23*								
Employment	−.07	.11	.11	.12	−.22*	−.09							
Unpredictability	−.01	.20*	.14	.22*	−.15	−.10	−.03						
Threat	.12	.25***	.13	.21*	−.12	−.07	.11	.71***					
Deprivation	.10	.19*	.13	.15	−.05	−.03	.10	.67***	.62***				
Empathy (IRI)	−.04	.17	.07	.03	−.01	−.08	.00	.06	.16	.00			
Emp Acc	.15	.16	−.04	.03	.02	−.06	−.04	−.07	−.02	−.07	−.02		
Antisocial behavior	−.17	−.16	−.14	.09	−.01	−.15	−.05	.14	.15	.14	−.01	−.16	

Computed correlation used Pearson-method with pairwise-deletion.

Educ. education, *Employ.* employment, *Unpredict.* unpredictability, *Depriv.* deprivation, *Emp. Acc.* empathic accuracy.

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

Table 3 Direct effects between three dimensions of early life adversity and empathic accuracy

	Outcome: average empathic accuracy								
	Model A (unpredictability)			Model B (threat)			Model C (deprivation)		
Predictors	*Estimates*	*CI*	*p*	*Estimates*	*CI*	*p*	*Estimates*	*CI*	*p*
Sex (female)	.41	.03–.80	**.04**	.40	.01–.80	**.04**	.41	.02–.79	**.04**
Sex (no answer)	.60	−.92 to 2.12	.44	.50	−1.02 to 2.02	.51	.62	−.90 to 2.15	.42
Age	.01	−.01 to .02	.28	.01	−.01 to .02	.25	.01	−.01 to .02	.22
Cognitive Ability	.16	−.03 to .34	.10	.15	−.03 to .34	.11	.16	−.03 to .34	.10
Income	−.02	−.06 to .02	.31	−.02	−.06 to .02	.37	−.02	−.06 to .02	.35
Unpredictability	−.10	−.29 to .08	.26						
Threat				−.06	−.24 to .13	.54			
Deprivation							−.11	−.29 to .07	.23
Observations	124			124			124		
R^2/R^2 adjusted	.079/.032			.072/.024			.080/.033		

Note: Values in bold reflect *p*-values less than, or equal to, .05

scores (unpredictability $\beta = .02$, $p = .82$, threat $\beta = .13$, $p = .18$, deprivation $\beta = -.03$, $p = .76$). This pattern was consistent when subtypes of the total empathy score were examined (Supplement Tables S1, S2, and S3.

Analyses exploring the association between both operationalizations of empathy and antisocial behavior also did not uncover significant associations (empathic accuracy task $\beta = -.13$, $p = .15$; self-report empathy $\beta = .01$, $p = .88$; see Supplement Table S4 for analogous models with IRI empathy subtypes).

Empathy as a Moderator of Dimensions of ELA and Antisocial Behavior

Unpredictability The empathic accuracy score was first entered in a linear model as a moderator of the association between unpredictability in childhood (independent variable, IV) and self-reported antisocial behavior in adulthood (dependent variable, DV) (see Table 5, Model A). The interaction between unpredictability in childhood and average empathic accuracy was significant ($\beta = -.26$, $p = .002$). Simple slope analyses indicated a significant association between unpredictability in childhood and adult antisocial behavior at *low* levels of average empathic accuracy ($\beta = .38$, $p < .001$) but not at average ($\beta = .11$, $p = .20$) and high ($\beta = -.15$, $p = .22$) levels of average empathic accuracy, suggesting that low empathic accuracy skills in the context of an unpredictable childhood may be a risk factor for adult antisocial behavior (see Fig. 2). We ran an analogous model using the total empathy score from the IRI, instead of empathic accuracy, as a moderator in the association between unpredictability in childhood and adult

Table 4 Direct effects between three dimensions of early life adversity and self-reported empathy

	Outcome: self-report empathy (Interpersonal Reactivity Index)								
	Model A (Unpredictability)			Model B (Threat)			Model C (Deprivation)		
Predictors	*Estimates*	*CI*	*p*	*Estimates*	*CI*	*p*	*Estimates*	*CI*	*p*
Sex (female)	.33	−.06 to .73	.10	.29	−.10 to .69	.14	.35	−.05 to .74	.08
Sex (no answer)	.44	−1.11 to 1.99	.57	.28	−1.25 to 1.81	.72	.54	−1.02 to 2.09	.50
Age	.00	−.02 to .01	.50	−.01	−.02 to .01	.40	.00	−.02 to .01	.52
Cognitive Ability	−.06	−.24 to .13	.57	−.04	−.23 to .15	.67	−.06	−.25 to .13	.55
Income	−.01	−.05 to .03	.48	−.01	−.05 to .03	.50	−.02	−.05 to .02	.44
Unpredictability	.02	−.16 to .21	.82						
Threat				.13	−.06 to .32	.18			
Deprivation							−.03	−.21 to .16	.76
Observations	124.00			124.00			124.00		
R^2/R^2 adjusted	.043/−.007			.057/.009			.043/−.006		

Table 5 Average empathic accuracy as a moderator in the association between three dimensions of ELA and antisocial behavior

	Outcome variable: adult antisocial behavior (SRDS)								
	Model A (unpredictability)			Model B (threat)			Model C (deprivation)		
Predictors	*Estimates*	*CI*	*p*	*Estimates*	*CI*	*p*	*Estimates*	*CI*	*p*
Cognitive Ability	.02	−.16 to .19	.85	.04	−.14 to .23	.66	−.02	−.19 to .16	.86
Sex (female)	−.23	−.60 to .14	.22	−.32	−.71 to .07	.11	−.21	−.58 to .16	.26
Sex (no answer)	−.45	−1.89 to .99	.54	−.59	−2.07 to .89	.43	−.61	−2.04 to .81	.40
Age	−.01	−.03 to .00	.05	−.01	−.03 to .00	.07	−.01	−.03 to −.00	**.04**
Income	−.04	−.07 to −.00	**.05**	−.03	−.07 to .00	.07	−.03	−.06 to .01	.14
EmpAcc	−.11	−.28 to .06	.21	−.14	−.32 to .05	.14	−.09	−.26 to .09	.33
Unpredictability	.11	−.06 to .29	.20						
Unpredict. × EmpAcc	−.26	−.41 to −.11	**.00**						
Threat				.20	.02 to .38	**.03**			
Threat × Emp Acc				−.07	−.25 to .11	.47			
Deprivation							.15	−.02 to .32	.08
Deprivation × EmpAcc							−.26	−.41 to −.12	**<.001**
Observations	124			124			124		
R^2/R^2 adjusted	.198/.142			.135/.075			.211/.156		

Note: Values in bold reflect *p*-values less than, or equal to, .05

antisocial behavior (see Table 6, model A). Results found no main effect of IRI on adult antisocial behavior ($\beta = .01$, $p = .909$) and no significant interaction between unpredictability in childhood and total IRI score ($\beta = .05$, $p = .574$). Results were the same across supplemental models with unpredictability and the three self-reported empathy subtypes scores (Supplement Table S5).

Threat The empathic accuracy score was next entered in a linear model as a moderator of the association between the dimension of threat in childhood (IV) and self-reported antisocial behavior in adulthood (DV) (see Table 5, model B). There was a main effect of threat on adult antisocial behavior ($\beta = .20$, $p = .030$) but no significant interaction between the dimension of threat and empathic accuracy on antisocial behavior. We again ran an analogous model using the total empathy score from the IRI, instead of empathic accuracy, as a moderator in the association between abuse in childhood and adult antisocial behavior (Table 6, model B). Results found no significant interaction between childhood

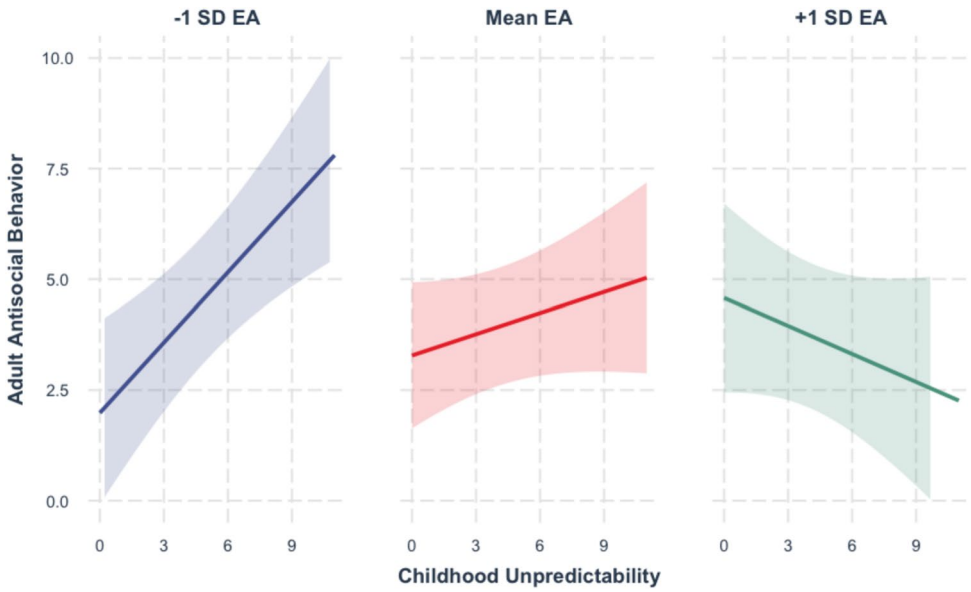

Fig. 2 Unpredictability in childhood (measured via the Questionnaire of Unpredictability in Childhood – Unpredictability Score) and adult antisocial behavior at three levels of empathic accuracy (EA). The three levels from left to right are (1) one standard deviation [SD] below the average EA, (2) the average EA, and (3) and one SD above the average EA

Table 6 Self-reported empathy as a moderator in the association between three dimensions of ELA and antisocial behavior

	Outcome variable: adult antisocial behavior (SRDS)								
	Model A (unpredictability)			Model B (threat)			Model C (deprivation)		
Predictors	*Estimates*	*CI*	*p*	*Estimates*	*CI*	*p*	*Estimates*	*CI*	*p*
(Intercept)	1.00	.31 to 1.69	**.01**	1.11	.42 to 1.80	**.00**	1.08	.39 to 1.77	**.00**
Cognitive Ability	.00	−.19 to .19	.99	.03	−.16 to .22	.75	.01	−.18 to .19	.94
Sex (female)	−.34	−.74 to .06	.09	−.35	−.74 to .05	.08	−.34	−.74 to .06	.09
Sex (no answer)	−.63	−2.16 to .89	.41	−.64	−2.14 to .86	.40	−.70	−2.23 to .82	.36
Age	−.01	−.03 to .00	.07	−.02	−.03 to −.00	**.04**	−.01	−.03 to −.00	**.04**
Income	−.03	−.07 to .01	.13	−.03	−.07 to .01	.09	−.03	−.07 to .01	.10
Empathy (IRI)	−.01	−.19 to .17	.93	−.03	−.21 to .15	.72	.00	−.18 to .17	.96
Unpredictability	.16	−.02 to .34	.08						
Unpredict. X IRI	.05	−.13 to .23	.62						
Threat				.22	.03 to .41	**.02**			
Threat X IRI				.00	−.18 to .17	.99			
Deprivation							.19	.01 to .37	**.04**
Deprivation X IRI							.03	−.13 to .20	.69
Observations	124			124			124		
R^2/R^2 adjusted	.103/.040			.119/.058			.111/.049		

abuse and total IRI score ($\beta = -.01$, $p = .905$), with similar results for supplemental models with threat and the three self-reported empathy subtypes scores (Supplement Table S6).

Deprivation Average empathic accuracy score was lastly entered in a linear model as a moderator of the association between the dimension of deprivation in childhood (IV) and self-reported antisocial behavior in adulthood (DV) (see Table 5, model C). As in the case of unpredictability in childhood, the interaction between deprivation and average empathic accuracy was significant ($\beta = -.261$, $p < .001$). Simple slope analyses revealed a similar pattern to unpredictability in childhood, in that neglect was positively and significantly associated with antisocial behavior in adulthood only at low levels of empathic accuracy ($\beta = .41$, $p < .001$) and not at average ($\beta = .15$, $p = .08$) and above-average ($\beta = -.11$, $p = .35$) levels of empathic accuracy (see Fig. 3). A model using the total empathy score from the IRI as a moderator in the association between

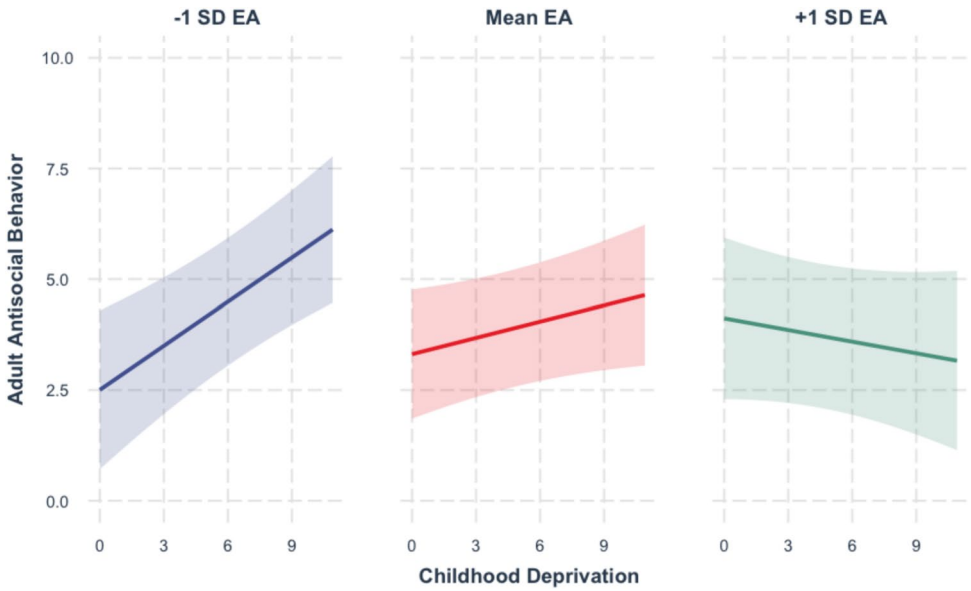

Fig. 3 Deprivation in childhood (measured via the Maltreatment Abuse and Exposure Scale Neglect Score) and adult antisocial behavior at three levels of empathic accuracy (EA). The three levels from left to right are (1) one standard deviation [SD] below the average EA, (2) the average EA, and (3) and one SD above the average EA

deprivation and adult antisocial behavior found no significant interaction (Table 6, model C; $\beta = .05$, $p = .576$), consistent with the other models using IRI as the measure of empathy. Again, supplemental models with deprivation and the three self-reported empathy subtypes scores yielded no significant results (Supplement Table S7).

Testing Difference between Interaction Terms

We directly tested whether the interactions between empathic accuracy and both unpredictability and deprivation were significantly different from the (non-significant) interaction term between empathic accuracy and threat. We compared the beta terms while accounting for correlations between the variables using the function "r.test" from {psych} package (Revelle, 2022). A test between the threat × empathic accuracy interaction term and the unpredictability × empathic accuracy interaction term, accounting for the correlation between the two ($r = .727$), revealed that the two were significantly different, $t = 3.13$, $p < .01$. Next, we tested the difference between the threat × empathic accuracy interaction term and the deprivation × empathic accuracy interaction term, accounting for the correlation between the two ($r = .670$) and again found them to be significantly different, $t = 2.79$, $p < .01$. These comparisons further strengthen the specificity of our findings that empathic accuracy moderates the effect of unpredictability and deprivation, but not threat, on adult antisocial behavior.

Discussion

Our study investigated whether empathy mediated versus moderated associations between three dimensions of ELA and antisocial behavior using two different operationalizations of empathy. We explored these associations with a naturalistic, task-based measure called the Empathic Accuracy Task and a commonly used self-report measure, the Interpersonal Reactivity Index (IRI). We did not find evidence of empathic accuracy or self-reported empathy as a mediator between the ELA-antisociality link. That is, we observed no significant associations between unpredictability, deprivation, and threat and empathy (*a* path) or between empathy and adult antisocial behavior (*b* path). This was the case for both the task-based and self-report measure of empathy. Instead, results supported a moderation framework showing that increased experiences of ELA, paired with lower empathic accuracy skills, related to more antisocial behavior for individuals exposed to dimensions of unpredictability and deprivation. In the case of threat in childhood, there was no significant interaction with empathic accuracy on antisocial behavior. These moderation findings were only observed when the task-based measure, and not self-report measure, of empathy was used.

Our work joins a body of research demonstrating that being able to accurately read other's emotions, an extremely complex skill that may be insufficiently captured by self-report questionnaires, is crucial for social functioning (Zaki et al., 2008). The empathic accuracy task used in this current study has been shown to correlate with social dysfunction in the context of psychopathology such as psychosis (Lee et al., 2011; Ripoll et al., 2013) and hypomania (Devlin et al., 2016). However, to our knowledge, our work is the first to examine multiple types of ELA together with this naturalistic task. Further, only one study has explored empathic accuracy related to antisociality-related phenotypes in adults, indeed finding that decreased empathic accuracy was associated with increased antisocial behavior (Brook & Kosson, 2013). Our results align with and underscore this finding, responding to a need to apply empathic accuracy paradigms to antisociality-related phenotypes, given the scarcity, and high potential clinical and public health impact, of such research (Rum & Perry, 2020). Our results suggested that the Empathic Accuracy Task may be a more sensitive measure of empathy compared to the self-report measure, the IRI. The IRI is widely deployed despite work pointing to its lack of construct validity (Chrysikou & Thompson, 2016) and low correlations between the IRI and naturalistic measures of empathy in clinical (Lee et al., 2011) and non-clinical populations (Herrera et al., 2018). Within our sample, the correlation between the IRI and the empathic accuracy task was $r = -.02$, consistent with non-significant correlations between the IRI and empathic accuracy in other samples (e.g., Mackes et al., 2018).

As hypothesized, our findings suggest that empathic accuracy might be particularly influential in the association between adversities without consistent inputs (e.g., unpredictability, deprivation) and antisocial behavior. Literature indicates that observers rely on emotional cues relative to how reliable those cues are in predicting underlying emotions (Ong et al., 2015). Environments where cues are unpredictable, therefore, may be less conducive to learning how to accurately predict emotions during development. As reviewed, unpredictable environments have also been associated with greater risk for executive function deficits (Hildyard & Wolfe, 2002; McLaughlin, Sheridan & Lambert, 2014; McLaughlin, Sheridan, Winter et al., 2014). Executive functions are subsequently connected to antisocial behavior through influencing the self-regulation of socially acceptable behavior (Ogilvie et al., 2011). High empathic accuracy skills may indicate better responsivity to the cues of others among individuals at risk for aggression through exposure to unpredictability and deprivation. Empathic accuracy skills among those who have faced adversity, therefore, could be a targetable resilience factor by which close social

relationships could be fostered (Ickes et al., 2005). It may also be the case that ELA may alter someone's *motivations* to empathize with a target, rather than changing underlying skills or ability (Zaki, 2014). Future work may test this hypothesis by increasing a participant's motivations to empathize via incentives or instruction.

Empathic accuracy was not observed to be a moderator of the association between threat and antisocial behavior, despite there being a direct effect of threat on adult antisociality. Threat has been less consistently associated with deficits in cognitive and executive functioning skills compared to deprivation and unpredictability (Andrews et al., 2021; Johnson et al., 2021; Wade et al., 2022) and is more consistently associated with atypical processing of emotional information through alterations in emotional reactivity and regulation pathways (McLaughlin, Sheridan & Lambert, 2014; McLaughlin, Sheridan, Winter et al., 2014; Miller et al., 2018). Therefore, it is likely that threat might be more related to aspects of empathy relying more heavily on *affective* processing. Future work should explore these distinctions further by adapting the Empathic Accuracy task to include an affective component as others have done (Mackes et al., 2018) and correlate distinct aspects of the task with deprivation and threat dimensions.

Of note, there were no direct associations between any dimension of childhood adversity and empathy operationalizations (either task-based or self-reported). The lack of direct association between ELA dimensions and empathy joins other work exploring ELA-empathy connections and producing inconclusive results. That is, while some empirical studies have established connections between ELA and increased empathy (Dillon-Owens et al., 2022; Kara & Selcuk, 2021; Trach et al., 2023), others have found ELA to be connected to *decreased* empathy (Narvey et al., 2021; Quas et al., 2017; Williford et al., 2016) or unrelated to empathy at all (Espelage et al., 2018; Peterson et al., 2022; Segura et al., 2020). Such muddled findings reflect our imprecise understanding of exactly how a diverse range of adverse experiences may come to impact empathy and leave open the door to future exploration. Future work should continue to investigate the role of specific empathy subtypes (e.g., *personal distress*) as they relate to ELA. That is, it is plausible that ELA could be related to an overall *increased* empathic response by increasing sensitivity to others' emotional distress (Benz et al., 2023) or a *decreased* empathic response by reducing one's capacity to tolerate personal distress involved in supporting another person's emotions (Troop-Gordon et al., 2017).

Furthermore, while the lack of any direct association between ELA and empathy may run contrary to patterns suggested by literature on "Altruism Born of Suffering" (ABS), this lack of association is consistent with the overall inconsistent work on ELA and empathy and may reflect theoretical and methodological differences between this work and the ABS literature. These include the development period of interest and types of adversity investigated. Adversity at any age can be impactful; yet, a plethora of research demonstrates unique and deleterious correlates of adversity experienced specifically in *childhood*. ABS literature typically focuses on *lifetime* adversity in adults, precluding the ability to pinpoint effects of adversity in childhood (Lim & DeSteno, 2016, 2020). It may be the case that altruism is "born of suffering" when adversity is experienced in adulthood compared to earlier in life when critical socioemotional skills are developing. Additionally, ABS research has predominately focused on a specific set of adversities descried as collectively experienced (e.g., natural disasters) and intentionally inflicted (e.g., wars) (Vollhardt, 2009). However, this emphasis ignores other widespread and chronic adversities such as neighborhood, community, or intimate partner violence, experiences that are witnessed by 44–82% of children (Palacios-Barrios et al., 2024; Stein et al., 2003). Therefore, the different types and timings of adversities examined by ABS scholars may explain how ABS findings differ from others in the literature on ELA and empathy, including the current study.

The findings presented here benefit from various strengths. To our knowledge, this study is the first to consider how dimensions of adversity associate with empathy, overcoming limitations of prior work considering specific adversities and cumulative risk. Understanding that deficits in cognitive empathy may be more likely to occur among individuals exposed to unpredictability and deprivation compared to threat may identify individuals most at risk for later social problems associated with empathy deficits. Our work is also the first to connect the ecologically valid Empathic Accuracy Task to dimensions of ELA. This task captures empathy more naturalistically than commonly used questionnaires and reliably advances our understanding within this muddled literature.

Alongside these strengths exist several limitations. This study represents a novel exploration of empathy and antisocial behavior integrated with dimensional models of adversity. Ideas of dimensionality within ELA are debated by scholars, with some suggesting that dimensions are largely fabricated constructs and do not represent "natural" categories (Smith & Pollak, 2021). Other researchers and empirical evidence have distinguished between types of adversity such as threat and deprivation, experiences of adversity often comprise of multiple dimensions and categories (Thomason & Marusak, 2017) and do not necessarily map onto how the ELA is experienced by the individuals or biological systems (Hein & Monk, 2017). There also may be critical differences between exposure to an event versus the subjective experience of a child,

underscoring the importance of assessing for an individual's subjective distressing experience (or lack thereof) of an ELA (Kahhale et al., 2023). This work advances the literature by extending dimensional models of adversity to studies of empathy and antisocial behavior and suggests space for future work to consider alternative aspects of adversity that may be influential within these associations such as the developmental timing, chronicity, intensity, and severity of ELA (Manly et al., 2001; Woodard & Pollak, 2020). Further, while there are many advantages to using online samples, data collection online is susceptible to concerns such as sampling bias and inattentiveness (Newman et al., 2021). Our work relies on retrospective measures of adversity, which despite being widely used and psychometrically reliable, can be vulnerable to recall biases (Hardt & Rutter, 2004). Future work should explore additional methods of collecting information retrospectively (i.e., alternate informants, examining official state agency records) and prospectively among youth samples. This work also considers one aspect of empathy—empathic accuracy—and operationalization via the Empathic Accuracy video task. Studies employing several task-based measures of empathic accuracy could lend internal reliability to the measures and lead to improved ecological validity of findings.

There are many more avenues to continue exploring such topics. While this study considers empathic accuracy for emotional stories in general, future research could explore differences in empathy for positive versus negative stimuli among ELA-exposed individuals, as work has suggested stronger links between ELA and negatively valenced stimuli (Peters et al., 2019). Given connections between threat adversity and emotional dysregulation, examining performance on a task measuring affective empathy among threat-exposed samples would directly test the hypothesis left by a lack of association between threat adversity and empathic accuracy. Researchers could directly test our work's implications via a longitudinal treatment study bolstering empathic accuracy skills among individuals exposed to deprivation and unpredictability adversity. Lastly, extending this work to neural correlates of empathy subtypes would lend additional evidence for specific, dimension-related changes to empathy subtypes in the brain (Eres et al., 2015).

This study emphasizes the significance of empathic accuracy as a moderator between certain dimensions of adversity and antisocial behavior. Results contribute to our understanding of the complex interplay between early life experiences, empathy abilities, and social behaviors, highlighting the importance of considering multiple factors when examining the development of antisocial behavior.

Additional Information

Funding This work was supported by the Psi Chi International Honors Society in Psychology Graduate Research Grant (awarded to I.K., July 2022), the University of Pittsburgh Andrew W. Mellon Fellowship (awarded to I.K.), and the University of Pittsburgh Learning, Research and Development Center (LRDC) for funds provided to I.K. and J.L.H.

Conflicts of Interest The authors declare no conflict of interest.

Data Availability De-identified behavioral and task data, as well as data cleaning and analysis files, can be found on the study GitHub.

Code Availability Not applicable.

Authors' Contributions Not applicable.

Ethics Approval Not applicable.

Consent to Participate Not applicable.

Consent for Publication Not applicable.

Supplementary Information The online version contains supplementary material available at https://doi.org/10.1007/s42761-024-00280-y.

References

Adler, N. E., Boyce, T., Chesney, M. A., Cohen, S., Folkman, S., Kahn, R. L., & Syme, S. L. (1994). Socioeconomic status and health: The challenge of the gradient. *American Psychologist, 49*(1), 15.

American Psychiatric Association. (2013). Conduct disorder. In *Diagnostic and statistical manual of mental disorders (5th ed.)*.

Anderson, C. A., & Bushman, B. J. (2002). Human aggression. *Annual Review of Psychology, 53*(1), 27–51. https://doi.org/10.1146/annurev.psych.53.100901.135231

Andrews, K., Atkinson, L., Harris, M., & Gonzalez, A. (2021). Examining the effects of household chaos on child executive functions: A meta-analysis. *Psychological Bulletin, 147*(1), 16.

Beckett, C., Castle, J., Rutter, M., & Sonuga-Barke, E. J. (2010). Vi. Institutional deprivation, specific cognitive functions, and scholastic achievement: English and Romanian Adoptee (era) Study Findings. *Monographs of the Society for Research in Child Development*, *75*(1), 125–142. https://doi.org/10.1111/j.1540-5834.2010.00553.x

Benz, A. B. E., Dimitroff, S. J., Jeggle, C., Gaertner, R. J., Meier, M., Unternaehrer, E., Bentele, U. U., Denk, B. F., Klink, E. S. C., & Pruessner, J. C. (2023). Increased empathic distress in adults is associated with higher levels of childhood maltreatment. *Scientific Reports, 13*(1), 4087. https://doi.org/10.1038/s41598-023-30891-7

Bethell, C., Davis, M., Gombojav, N., Stumbo, S., & Powers, K. (2017). *Issue brief: A national and across state profile on adverse childhood experiences among children and possibilities to heal and thrive.* Johns Hopkins Bloomberg School of Public Health.

Blair, R. J. R. (2005). Responding to the emotions of others: Dissociating forms of empathy through the study of typical and psychiatric populations. *Consciousness and Cognition, 14*(4), 698–718. https://doi.org/10.1016/j.concog.2005.06.004

Blair, R. J. R. (2018). Traits of empathy and anger: Implications for psychopathy and other disorders associated with aggression. *Philosophical Transactions of the Royal Society b: Biological*

Sciences, 373(1744), 20170155. https://doi.org/10.1098/rstb.2017.0155

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

Braga, T., Cunha, O., & Maia, Â. (2018). The enduring effect of maltreatment on antisocial behavior: A meta-analysis of longitudinal studies. *Aggression and Violent Behavior, 40*, 91–100. https://doi.org/10.1016/j.avb.2018.04.003

Brook, M., & Kosson, D. S. (2013). Impaired cognitive empathy in criminal psychopathy: Evidence from a laboratory measure of empathic accuracy. *Journal of Abnormal Psychology, 122*(1), 156–166. https://doi.org/10.1037/a0030261

Burt, S. A. (2012). How do we optimally conceptualize the heterogeneity within antisocial behavior? An argument for aggressive versus non-aggressive behavioral dimensions. *Clinical Psychology Review, 32*(4), 263–279. https://doi.org/10.1016/j.cpr.2012.02.006

Chen, F. R., Fung, A. L. C., & Raine, A. (2021). The cognitive, affective, and somatic empathy scales (CASES): Cross-cultural replication and specificity to different forms of aggression and victimization. *Journal of Personality Assessment, 103*(1), 80–91. https://doi.org/10.1080/00223891.2019.1677246

Cho, Y. I., Martin, M. J., Conger, R. D., & Widaman, K. F. (2010). Differential item functioning on Antisocial Behavior Scale items for adolescents and young adults from single-parent and two-parent families. *Journal of Psychopathology and Behavioral Assessment, 32*(2), 157–168. https://doi.org/10.1007/s10862-009-9145-1

Chrysikou, E. G., & Thompson, W. J. (2016). Assessing cognitive and affective empathy through the Interpersonal Reactivity Index: An argument against a two-factor model. *Assessment, 23*(6), 769–777. https://doi.org/10.1177/1073191115599055

Dallaire, D. H., & Zeman, J. L. (2013). II. Empathy as a protective factor for children with incarcerated parents: *Monographs of the Society for Research in Child Development*, *78*(3), 7–25. https://doi.org/10.1111/mono.12018

Davis, E. P., Korja, R., Karlsson, L., Glynn, L. M., Sandman, C. A., Vegetabile, B., Kataja, E.-L., Nolvi, S., Sinervä, E., Pelto, J., Karlsson, H., Stern, H. S., & Baram, T. Z. (2019). Across continents and demographics, unpredictable maternal signals are associated with children's cognitive function. *eBioMedicine*, *46*, 256–263. https://doi.org/10.1016/j.ebiom.2019.07.025

Davis, M. (1980). *A multidimensional approach to individual differences in empathy*.

Day, A., Casey, S., & Gerace, A. (2010). Interventions to improve empathy awareness in sexual and violent offenders: Conceptual, empirical, and clinical issues. *Aggression and Violent Behavior, 15*(3), 201–208.

De Kemp, R. A. T., Overbeek, G., De Wied, M., Engels, R. C. M. E., & Scholte, R. H. J. (2007). Early adolescent empathy, parental support, and antisocial behavior. *The Journal of Genetic Psychology, 168*(1), 5–18. https://doi.org/10.3200/GNTP.168.1.5-18

Decety, J., & Meyer, M. (2008). From emotion resonance to empathic understanding: A social developmental neuroscience account. *Development and Psychopathology, 20*(4), 1053–1080. https://doi.org/10.1017/S0954579408000503

Devlin, H. C., Zaki, J., Ong, D. C., & Gruber, J. (2016). Tracking the emotional highs but missing the lows: Hypomania risk is associated with positively biased empathic inference. *Cognitive Therapy and Research, 40*(1), 72–79. https://doi.org/10.1007/s10608-015-9720-6

Dillon-Owens, C., Findley-Van Nostrand, D., Ojanen, T., Buchholz, C., & Valdes, O. (2022). Early adolescent cognitive and affective empathy: Associations with social–emotional adjustment. *Social Psychology, 53*(5), 292–302. https://doi.org/10.1027/1864-9335/a000499

Dodge, K. A. (2011). Social information processing patterns as mediators of the interaction between genetic factors and life experiences in the development of aggressive behavior. In *Human aggression and violence: Causes, manifestations, and consequences* (pp. 165–185). American Psychological Association. https://doi.org/10.1037/12346-009

Dziobek, I. (2012). Comment: Towards a more ecologically valid assessment of empathy. *Emotion Review, 4*(1), 18–19.

Eisenberg, N., & Miller, P. A. (1987). The relation of empathy to prosocial and related behaviors. *Psychological Bulletin, 101*, 91–119. https://doi.org/10.1037/0033-2909.101.1.91

Elliott, D. S., Huizinga, D., & Ageton, S. S. (1985). *Explaining delinquency and drug use*. Sage Publications.

Ellis, B. J., Figueredo, A. J., Brumbach, B. H., & Schlomer, G. L. (2009). Fundamental dimensions of environmental risk: The impact of harsh versus unpredictable environments on the evolution and development of life history strategies. *Human Nature, 20*(2), 204–268. https://doi.org/10.1007/s12110-009-9063-7

Ellis, B. J., Sheridan, M. A., Belsky, J., & McLaughlin, K. A. (2022). Why and how does early adversity influence development? Toward an integrated model of dimensions of environmental experience. *Development and Psychopathology*, 1–25. https://doi.org/10.1017/S0954579421001838

Eres, R., Decety, J., Louis, W. R., & Molenberghs, P. (2015). Individual differences in local gray matter density are associated with differences in affective and cognitive empathy. *NeuroImage, 117*, 305–310. https://doi.org/10.1016/j.neuroimage.2015.05.038

Espelage, D. L., Hong, J. S., Kim, D. H., & Nan, L. (2018). Empathy, attitude towards bullying, theory-of-mind, and non-physical forms of bully perpetration and victimization among U.S. Middle School Students. *Child & Youth Care Forum*, *47*(1), 45–60. https://doi.org/10.1007/s10566-017-9416-z

Evans, G. W., Li, D., & Whipple, S. S. (2013). Cumulative risk and child development. *Psychological Bulletin, 139*(6), 1342–1396. https://doi.org/10.1037/a0031808

Fourie, M. M., Stein, D. J., Solms, M., Gobodo-Madikizela, P., & Decety, J. (2019). Effects of early adversity and social discrimination on empathy for complex mental states: An fMRI investigation. *Scientific Reports, 9*, 12959. https://doi.org/10.1038/s41598-019-49298-4

Gao, Z., Ye, T., Shen, M., & Perry, A. (2016). Working memory capacity of biological movements predicts empathy traits. *Psychonomic Bulletin & Review, 23*, 468–475.

Gard, A. M., Waller, R., Shaw, D. S., Forbes, E. E., Hariri, A. R., & Hyde, L. W. (2017). The long reach of early adversity: Parenting, stress, and neural pathways to antisocial behavior in adulthood. *Biological Psychiatry. Cognitive Neuroscience and Neuroimaging, 2*(7), 582–590. https://doi.org/10.1016/j.bpsc.2017.06.005

Glynn, L. M., Stern, H. S., Howland, M. A., Risbrough, V. B., Baker, D. G., Nievergelt, C. M., Baram, T. Z., & Davis, E. P. (2019). Measuring novel antecedents of mental illness: The Questionnaire of Unpredictability in Childhood. *Neuropsychopharmacology*, *44*(5), Article 5. https://doi.org/10.1038/s41386-018-0280-9

Goldstein, A. P., Glick, B., & Gibbs, J. C. (1998). *Aggression replacement training: A comprehensive intervention for aggressive youth*. Research Press.

Grossman, D. C., Neckerman, H. J., Koepsell, T. D., Liu, P.-Y., Asher, K. N., Beland, K., Frey, K., & Rivara, F. P. (1997). Effectiveness of a violence prevention curriculum among children in elementary school: A randomized controlled trial. *JAMA, 277*(20), 1605–1611.

Hanson, J. L., Hariri, A. R., & Williamson, D. E. (2015). Blunted ventral striatum development in adolescence reflects emotional

neglect and predicts depressive symptoms. *Biological Psychiatry, 78*(9), 598–605. https://doi.org/10.1016/j.biopsych.2015.05.010

Hanson, R. K., & Morton-Bourgon, K. E. (2019). The characteristics of persistent sexual offenders: A meta-analysis of recidivism studies. In *Clinical forensic psychology and law* (pp. 67–76). Routledge.

Hardt, J., & Rutter, M. (2004). Validity of adult retrospective reports of adverse childhood experiences: Review of the evidence. *Journal of Child Psychology and Psychiatry, 45*(2), 260–273. https://doi.org/10.1111/j.1469-7610.2004.00218.x

Hein, T. C., & Monk, C. S. (2017). Research review: Neural response to threat in children, adolescents, and adults after child maltreatment–a quantitative meta-analysis. *Journal of Child Psychology and Psychiatry, 58*(3), 222–230.

Herrera, F., Bailenson, J., Weisz, E., Ogle, E., & Zaki, J. (2018). Building long-term empathy: A large-scale comparison of traditional and virtual reality perspective-taking. *PLoS ONE, 13*(10), e0204494. https://doi.org/10.1371/journal.pone.0204494

Hildyard, K. L., & Wolfe, D. A. (2002). Child neglect: Developmental issues and outcomes. *Child Abuse & Neglect, 26*(6), 679–695. https://doi.org/10.1016/S0145-2134(02)00341-1

Huizinga, D., & Elliott, D. S. (1986). Reassessing the reliability and validity of self-report delinquency measures. *Journal of Quantitative Criminology, 2*(4), 293–327.

Ickes, W., Simpson, J. A., & Orina, M. (2005). Empathic accuracy and inaccuracy in close relationships. *Other minds: How humans bridge the divide between self and others*, 310–322.

Ickes, W., Stinson, L., Bissonnette, V., & Garcia, S. (1990). Naturalistic social cognition: Empathic accuracy in mixed-sex dyads. *Journal of Personality and Social Psychology, 59*(4), 730.

Jaffee, S. R., Ambler, A., Merrick, M., Goldman-Mellor, S., Odgers, C. L., Fisher, H. L., Danese, A., & Arseneault, L. (2018). Childhood maltreatment predicts poor economic and educational outcomes in the transition to adulthood. *American Journal of Public Health, 108*(9), 1142–1147. https://doi.org/10.2105/AJPH.2018.304587

Johnson, D., Policelli, J., Li, M., Dharamsi, A., Hu, Q., Sheridan, M. A., McLaughlin, K. A., & Wade, M. (2021). Associations of early-life threat and deprivation with executive functioning in childhood and adolescence: A systematic review and meta-analysis. *JAMA Pediatrics, 175*(11), e212511–e212511.

Kahhale, I., Barry, K. R., & Hanson, J. L. (2023). Positive parenting moderates associations between childhood stress and corticolimbic structure. *PNAS Nexus*, *2*(6), pgad145. https://doi.org/10.1093/pnasnexus/pgad145

Kahhale, I., Hanson, J. L., Raine, A., & Byrd, A. L. (2024). Associations between subtypes of empathy and aggression in high-risk adolescents. *Journal of Psychopathology and Behavioral Assessment*.

Kara, B., & Selcuk, B. (2021).The role of socioeconomic adversity and armed conflict in executive function, theory of mind and empathy in children. *Child Psychiatry & Human Development, 54,* 533–545. https://doi.org/10.1007/s10578-021-01270-y

Kessler, R. C., McLaughlin, K. A., Green, J. G., Gruber, M. J., Sampson, N. A., Zaslavsky, A. M., Aguilar-Gaxiola, S., Alhamzawi, A. O., Alonso, J., Angermeyer, M., Benjet, C., Bromet, E., Chatterji, S., de Girolamo, G., Demyttenaere, K., Fayyad, J., Florescu, S., Gal, G., Gureje, O., … Williams, D. R. (2010). Childhood adversities and adult psychopathology in the WHO World Mental Health Surveys. *The British Journal of Psychiatry: The Journal of Mental Science*, *197*(5), 378–385. https://doi.org/10.1192/bjp.bp.110.080499

Kluwe-Schiavon, B., Viola, T. W., & Grassi-Oliveira, R. (2016). Cross-cultural adaptation of the Maltreatment and Abuse Chronology of Exposure (MACE) scale to Brazilian Portuguese. *Trends in Psychiatry and Psychotherapy, 38*, 33–39.

Lansford, J. E., Dodge, K. A., Pettit, G. S., Bates, J. E., Crozier, J., & Kaplow, J. (2002). A 12-year prospective study of the long-term effects of early child physical maltreatment on psychological, behavioral, and academic problems in adolescence. *Archives of Pediatrics & Adolescent Medicine, 156*(8), 824–830. https://doi.org/10.1001/archpedi.156.8.824

Lansford, J. E., Miller-Johnson, S., Berlin, L. J., Dodge, K. A., Bates, J. E., & Pettit, G. S. (2007). Early physical abuse and later violent delinquency: A prospective longitudinal study. *Child Maltreatment, 12*(3), 233–245. https://doi.org/10.1177/1077559507301841

Lee, J., Zaki, J., Harvey, P.-O., Ochsner, K., & Green, M. F. (2011). Schizophrenia patients are impaired in empathic accuracy. *Psychological Medicine, 41*(11), 2297–2304. https://doi.org/10.1017/S0033291711000614

Levenson, R. W., & Ruef, A. M. (1992). Empathy: A physiological substrate. *Journal of Personality and Social Psychology, 63*(2), 234.

Levy, J., Yirmiya, K., Goldstein, A., & Feldman, R. (2019). The neural basis of empathy and empathic behavior in the context of chronic trauma. *Frontiers in Psychiatry, 10*, 562. https://doi.org/10.3389/fpsyt.2019.00562

Lim, D., & DeSteno, D. (2016). Suffering and compassion: The links among adverse life experiences, empathy, compassion, and prosocial behavior. *Emotion, 16*(2), 175.

Lim, D., & DeSteno, D. (2020). Past adversity protects against the numeracy bias in compassion. *Emotion, 20*(8), 1344.

Locher, S. C., Barenblatt, L., Fourie, M. M., Stein, D. J., & Gobodo-Madikizela, P. (2014). Empathy and childhood maltreatment: A mixed-methods investigation. *Annals of Clinical Psychiatry: Official Journal of the American Academy of Clinical Psychiatrists, 26*(2), 97–110.

Mackes, N. K., Golm, D., O'Daly, O. G., Sarkar, S., Sonuga-Barke, E. J. S., Fairchild, G., & Mehta, M. A. (2018). Tracking emotions in the brain – Revisiting the Empathic Accuracy Task. *NeuroImage, 178*, 677–686. https://doi.org/10.1016/j.neuroimage.2018.05.080

Mackey, S., Chaarani, B., Kan, K.-J., Spechler, P. A., Orr, C., Banaschewski, T., Barker, G., Bokde, A. L. W., Bromberg, U., Büchel, C., Cattrell, A., Conrod, P. J., Desrivières, S., Flor, H., Frouin, V., Gallinat, J., Gowland, P., Heinz, A., Ittermann, B., … Garavan, H. (2017). Brain regions related to impulsivity mediate the effects of early adversity on antisocial behavior. *Biological Psychiatry*, *82*(4), 275–282. https://doi.org/10.1016/j.biopsych.2015.12.027

Maneta, E. K., Cohen, S., Schulz, M. S., & Waldinger, R. J. (2015). Linkages between childhood emotional abuse and marital satisfaction: The mediating role of empathic accuracy for hostile emotions. *Child Abuse & Neglect, 44*, 8–17. https://doi.org/10.1016/j.chiabu.2014.07.017

Manly, J. T., Kim, J. E., Rogosch, F. A., & Cicchetti, D. (2001). Dimensions of child maltreatment and children's adjustment: Contributions of developmental timing and subtype. *Development and Psychopathology, 13*(4), 759–782.

Marshall, W. L. (1999). Current status of North American assessment and treatment programs for sexual offenders. *Journal of Interpersonal Violence, 14*(3), 221–239.

McLaughlin, K. A. (2018). Future directions in childhood adversity and youth psychopathology. In *Future work in clinical child and adolescent psychology* (pp. 345–366). Routledge.

McLaughlin, K. A., & Sheridan, M. A. (2016). Beyond cumulative risk: A dimensional approach to childhood adversity. *Current Directions in Psychological Science, 25*(4), 239–245. https://doi.org/10.1177/0963721416655883

McLaughlin, K. A., Sheridan, M. A., & Lambert, H. K. (2014). Childhood adversity and neural development: Deprivation and threat as distinct dimensions of early experience. *Neuroscience &*

Biobehavioral Reviews, 47, 578–591. https://doi.org/10.1016/j.neubiorev.2014.10.012

McLaughlin, K. A., Sheridan, M. A., Winter, W., Fox, N. A., Zeanah, C. H., & Nelson, C. A. (2014). Widespread reductions in cortical thickness following severe early-life deprivation: A neurodevelopmental pathway to attention-deficit/hyperactivity disorder. *Biological Psychiatry, 76*(8), 629–638. https://doi.org/10.1016/j.biopsych.2013.08.016

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

Morelli, S. A., Lieberman, M. D., & Zaki, J. (2015). The emerging study of positive empathy. *Social and Personality Psychology Compass, 9*(2), 57–68. https://doi.org/10.1111/spc3.12157

Narvey, C., Yang, J., Wolff, K. T., Baglivio, M., & Piquero, A. R. (2021). The interrelationship between empathy and adverse childhood experiences and their impact on juvenile recidivism. *Youth Violence and Juvenile Justice, 19*(1), 45–67. https://doi.org/10.1177/1541204020939647

Newman, A., Bavik, Y. L., Mount, M., & Shao, B. (2021). Data collection via online platforms: Challenges and recommendations for future research. *Applied Psychology, 70*(3), 1380–1402. https://doi.org/10.1111/apps.12302

Ogilvie, J. M., Stewart, A. L., Chan, R. C. K., & Shum, D. H. K. (2011). Neuropsychological measures of executive function and antisocial behavior: A meta-analysis: Executive function and antisocial behavior. *Criminology, 49*(4), 1063–1107. https://doi.org/10.1111/j.1745-9125.2011.00252.x

Ong, D. C., Wu, Z., Zhi-Xuan, T., Reddan, M., Kahhale, I., Mattek, A., & Zaki, J. (2021). Modeling emotion in complex stories: The Stanford Emotional Narratives Dataset. *IEEE Transactions on Affective Computing, 12*(3), 579–594. https://doi.org/10.1109/TAFFC.2019.2955949

Ong, D. C., Zaki, J., & Goodman, N. D. (2015). Affective cognition: Exploring lay theories of emotion. *Cognition, 143*, 141–162. https://doi.org/10.1016/j.cognition.2015.06.010

Palacios-Barrios, E. E., Patel, K., & Hanson, J. L. (2024). Early life interpersonal stress and depression: Social reward processing as a potential mediator. *Progress in Neuro-Psychopharmacology and Biological Psychiatry, 129*, 110887.

Palumbo, I. M., & Latzman, R. D. (2021). Parsing associations between dimensions of empathy and reactive and proactive aggression. *Journal of Personality Disorders*, *35*(Supplement C), 56–74. https://doi.org/10.1521/pedi_2021_35_522

Pecukonis, E. V. (1990). A cognitive/affective empathy training program as a function of ego development in aggressive adolescent females. *Adolescence, 25*(97), 59.

Peters, A. T., Burkhouse, K. L., Kinney, K. L., & Luan Phan, K. (2019). The roles of early-life adversity and rumination in neural response to emotional faces amongst anxious and depressed adults. *Psychological Medicine, 49*(13), 2267–2278. https://doi.org/10.1017/S0033291718003203

Peterson, C. S., Zhu, Y., Germine, L. T., & Dunn, E. C. (2022). Associations between childhood trauma characteristics and theory of mind in adults: Results from a large, diverse sample. *Child Psychiatry & Human Development*https://doi.org/10.1007/s10578-022-01442-4

Polanco-Roman, L., Miranda, R., Hien, D., & Anglin, D. M. (2021). Racial/ethnic discrimination as race-based trauma and suicide-related risk in racial/ethnic minority young adults: The explanatory roles of stress sensitivity and dissociation. *Psychological Trauma: Theory, Research, Practice, and Policy, 13*, 759–767. https://doi.org/10.1037/tra0001076

Quas, J. A., Dickerson, K. L., Matthew, R., Harron, C., & Quas, C. M. (2017). Adversity, emotion recognition, and empathic concern in high-risk youth. *PLoS ONE, 12*(7), e0181606. https://doi.org/10.1371/journal.pone.0181606

Raine, A., & Chen, F. R. (2018). The Cognitive, Affective, and Somatic Empathy Scales (CASES) for children. *Journal of Clinical Child & Adolescent Psychology, 47*(1), 24–37. https://doi.org/10.1080/15374416.2017.1295383

Raine, A., Chen, F. R., & Waller, R. (2022). The cognitive, affective and somatic empathy scales for adults. *Personality and Individual Differences, 185*, 111238. https://doi.org/10.1016/j.paid.2021.111238

Ramsay, M. C., & Reynolds, C. R. (1995). Separate Digits tests: A brief history, a literature review, and a reexamination of the factor structure of the test of memory and learning (TOMAL). *Neuropsychology Review, 5*(3), 151–171. https://doi.org/10.1007/BF02214760

Revelle, W. (2022). *psych: Procedures for psychological, psychometric, and personality research*. Northwestern University. https://CRAN.R-project.org/package=psych

Ripoll, L. H., Zaki, J., Perez-Rodriguez, M. M., Snyder, R., Strike, K. S., Boussi, A., Bartz, J. A., Ochsner, K. N., Siever, L. J., & New, A. S. (2013). Empathic accuracy and cognition in schizotypal personality disorder. *Psychiatry Research, 210*(1), 232–241.

Rum, Y., & Perry, A. (2020). Empathic accuracy in clinical populations. *Frontiers in Psychiatry, 11*, 457. https://doi.org/10.3389/fpsyt.2020.00457

Schaffer, M., Clark, S., & Jeglic, E. L. (2009). The role of empathy and parenting style in the development of antisocial behaviors. *Crime & Delinquency, 55*(4), 586–599. https://doi.org/10.1177/0011128708321359

Segura, L., Estévez, J. F., & Estévez, E. (2020). Empathy and emotional intelligence in adolescent cyberaggressors and cybervictims. *International Journal of Environmental Research and Public Health, 17*(13), 4681. https://doi.org/10.3390/ijerph17134681

Serin, R. C., & Kuriychuk, M. (1994). Social and cognitive processing deficits in violent offenders: Implications for treatment. *International Journal of Law and Psychiatry, 17*(4), 431–441.

Sheridan, M. A., Peverill, M., Finn, A. S., & McLaughlin, K. A. (2017). Dimensions of childhood adversity have distinct associations with neural systems underlying executive functioning. *Development and Psychopathology, 29*(5), 1777–1794. https://doi.org/10.1017/S0954579417001390

Smith, K. E., & Pollak, S. D. (2021). Rethinking concepts and categories for understanding the neurodevelopmental effects of childhood adversity. *Perspectives on Psychological Science, 16*(1), 67–93. https://doi.org/10.1177/1745691620920725

Staub, E., & Vollhardt, J. R. (2008). Altruism born of suffering: The roots of caring and helping after victimization and other trauma. *American Journal of Orthopsychiatry*https://doi.org/10.1037/a0014223

Stein, B. D., Jaycox, L. H., Kataoka, S., Rhodes, H. J., & Vestal, K. D. (2003). Prevalence of child and adolescent exposure to community violence. *Clinical Child and Family Psychology Review, 6*(4), 247–264. https://doi.org/10.1023/B:CCFP.0000006292.61072.d2

Tarullo, A. R., Bruce, J., & Gunnar, M. R. (2007). False belief and emotion understanding in post-institutionalized children. *Social Development, 16*(1), 57–78.

Teicher, M. H., & Parigger, A. (2015). The 'Maltreatment and Abuse Chronology of Exposure'(MACE) scale for the retrospective assessment of abuse and neglect during development. *PLoS ONE, 10*(2), e0117423.

Thomason, M. E., & Marusak, H. A. (2017). Toward understanding the impact of trauma on the early developing human brain. *Neuroscience, 342*, 55–67.

Trach, J., Garandeau, C. F., & Malamut, S. T. (2023). Peer victimization and empathy for victims of bullying: A test of bidirectional associations in childhood and adolescence. *Child Development*, cdev.13907. https://doi.org/10.1111/cdev.13907

Troop-Gordon, W., Sugimura, N., & Rudolph, K. D. (2017). Responses to interpersonal stress: Normative changes across childhood and the impact of peer victimization. *Child Development, 88*(2), 640–657. https://doi.org/10.1111/cdev.12617

Vachon, D. D., Lynam, D. R., & Johnson, J. A. (2014). The (non)relation between empathy and aggression: Surprising results from a meta-analysis. *Psychological Bulletin, 140*(3), 751–773. https://doi.org/10.1037/a0035236

Van Der Stouwe, T., Asscher, J. J., Hoeve, M., Van Der Laan, P. H., & Stams, G. J. J. M. (2018). Social skills training (SST) effects on social information processing skills in justice-involved adolescents: Affective empathy as predictor or moderator. *Children and Youth Services Review, 90*, 1–7. https://doi.org/10.1016/j.childyouth.2018.05.006

van Goozen, S. H. M. (2015). The role of early emotion impairments in the development of persistent antisocial behavior. *Child Development Perspectives, 9*(4), 206–210. https://doi.org/10.1111/cdep.12134

Viding, E., McCrory, E., & Seara-Cardoso, A. (2014). Psychopathy. *Current Biology, 24*(18), R871–R874. https://doi.org/10.1016/j.cub.2014.06.055

Vollhardt, J. R. (2009). Altruism born of suffering and prosocial behavior following adverse life events: A review and conceptualization. *Social Justice Research, 22*(1), 53–97. https://doi.org/10.1007/s11211-009-0088-1

Wade, M., Wright, L., & Finegold, K. E. (2022). The effects of early life adversity on children's mental health and cognitive functioning. *Translational Psychiatry, 12*(1), 244. https://doi.org/10.1038/s41398-022-02001-0

Williford, A., Boulton, A. J., Forrest-Bank, S. S., Bender, K. A., Dieterich, W. A., & Jenson, J. M. (2016). The effect of bullying and victimization on cognitive empathy development during the transition to middle school. *Child & Youth Care Forum, 45*(4), 525–541. https://doi.org/10.1007/s10566-015-9343-9

Woodard, K., & Pollak, S. D. (2020). Is there evidence for sensitive periods in emotional development? *Current Opinion in Behavioral Sciences, 36*, 1–6.

Woods, D. L., Kishiyama, M. M., Yund, E. W., Herron, T. J., Edwards, B., Poliva, O., Hink, R. F., & Reed, B. (2011). Improving digit span assessment of short-term verbal memory. *Journal of Clinical and Experimental Neuropsychology, 33*(1), 101–111. https://doi.org/10.1080/13803395.2010.493149

Yagmurlu, B., Berument, S. K., & Celimli, S. (2005). The role of institution and home contexts in theory of mind development. *Journal of Applied Developmental Psychology, 26*(5), 521–537.

Yan, Z., Hong, S., Liu, F., & Su, Y. (2020). A meta-analysis of the relationship between empathy and executive function. *PsyCh Journal, 9*(1), 34–43.

Yazgan, I., Hanson, J. L., Bates, J. E., Lansford, J. E., Pettit, G. S., & Dodge, K. A. (2021). Cumulative early childhood adversity and later antisocial behavior: The mediating role of passive avoidance. *Development and Psychopathology, 33*(1), 340–350. https://doi.org/10.1017/S0954579419001809

Youngjohn, J. R., Larrabee, G. J., & Crook, T. H. (1992). Test-retest reliability of computerized, everyday memory measures and traditional memory tests. *Clinical Neuropsychologist, 6*(3), 276–286. https://doi.org/10.1080/13854049208404129

Zaki, J. (2014). Empathy: A motivated account. *Psychological Bulletin, 140*(6), 1608–1647. https://doi.org/10.1037/a0037679

Zaki, J., Bolger, N., & Ochsner, K. (2008). It takes two: The interpersonal nature of empathic accuracy. *Psychological Science, 19*(4), 399–404. https://doi.org/10.1111/j.1467-9280.2008.02099.x

Zaki, J., Weber, J., Bolger, N., & Ochsner, K. (2009). The neural bases of empathic accuracy. *Proceedings of the National Academy of Sciences, 106*(27), 11382–11387.

Zhang, X., Zhang, M., Zeng, M., Lan, M., Liu, Y., Li, J., Chen, H., & Yang, J. (2022). Childhood emotional neglect predicts empathic accuracy in social inclusion and exclusion contexts. *PsyCh Journal*, pchj.553. https://doi.org/10.1002/pchj.553