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Reduced Growth Mindset as a Mechanism Linking Childhood Trauma with Academic Performance and Internalizing Psychopathology

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Abstract

Background: Despite the high prevalence of childhood adversity and well-documented associations with poor academic achievement and psychopathology, effective, scalable interventions remain largely unavailable. Existing interventions targeting growth mindset—the belief that personal characteristics are malleable—have been shown to improve academic achievement and symptoms of psychopathology in youth.

Objective: The present study examines growth mindset as a potential modifiable mechanism underlying the associations of two dimensions of childhood adversity—threat and deprivation—with academic achievement and internalizing psychopathology.

Participants and Setting: Participants were 408 youth aged 10 – 18 years drawn from one timepoint of two longitudinal studies of community-based samples recruited to have diverse experiences of childhood adversity.

Method: Experiences of threat and deprivation were assessed using a multi-informant, multi-method approach. Youth reported on growth mindset of intelligence and symptoms of anxiety and depression. Parents provided information about youths' academic performance.

Results: Both threat and deprivation were independently associated with lower growth mindset, but when accounting for co-occurring adversities, only the association between threat and lower growth mindset remained significant. Lower growth mindset was associated with worse academic performance and greater symptoms of both anxiety and depression. Finally, there was a significant indirect effect of experiences of threat on both lower academic performance and greater symptoms of anxiety through lower growth mindset.

Conclusions: Findings suggest that growth mindset could be a promising target for efforts aimed at mitigating the impact of childhood adversity on academic achievement and psychopathology given the efficacy of existing brief, scalable growth mindset interventions.

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Keywords

Growth mindset; childhood adversity; deprivation; threat; academic achievement; internalizing symptoms

Childhood adversity is common, with approximately half of youth in the United States reporting exposure to at least one form of adversity, including abuse, neglect, witnessing domestic violence, parental separation, and chronic poverty (Finkelhor, Ormrod, et al., 2005; Green et al., 2010; McLaughlin et al., 2012). Childhood adversity is associated with a host of negative developmental outcomes, including poor academic performance and low educational attainment (Brooks-Gunn & Duncan, 1997; Entwisle et al., 2005; Lansford et al., 2002; Sirin, 2005). Population-based studies indicate that childhood adversity is a transdiagnostic risk factor associated with the onset of multiple forms of internalizing and externalizing psychopathology in childhood, adolescence, and adulthood (Caspi et al., 2014; Green et al., 2010; Keyes et al., 2012; McLaughlin et al., 2012). The strong associations of childhood adversity with poor academic achievement and the development of psychopathology underscores the importance of identifying mechanisms explaining these relationships that can be targeted by preventive interventions.

Childhood adversity might influence academic achievement and psychopathology through many potential developmental mechanisms. Recent work has demonstrated that these mechanisms vary systematically as a function of the nature of adversity experiences, with experiences involving threat versus deprivation having distinct influences on emotional, cognitive, and neural development (see McLaughlin et al., 2021 for a review). This conceptual model proposes that threat and deprivation reflect dissociable dimensions of early experience that operate through distinct neurodevelopmental pathways to confer risk for psychopathology and other downstream outcomes, like poor academic performance (McLaughlin et al., 2014, McLaughlin & Sheridan, 2016; Sheridan & McLaughlin, 2014). Threat encompasses experiences that pose serious harm or threat of harm to the physical integrity of the child, and includes experiences like physical and sexual abuse, witnessing domestic violence, and other types of violence exposure. Deprivation encompasses reductions in developmentally appropriate cognitive and social inputs from the environment, including experiences of physical and emotional neglect, low levels of cognitive stimulation, and insecure access to food and other necessities. Threat is proposed to have primary influences on neural circuits underlying emotional processing and learning (see McLaughlin & Lambert, 2017 for a review), contributing to enhanced perceptual sensitivity and attention to threat in the environment, elevated emotional reactivity, and difficulties with emotion regulation and emotional learning. Existing evidence supports these predictions, with consistent associations of threat, but not deprivation, with multiple forms of emotional processing (Heleniak et al., 2016; Jenness et al., 2021; Lambert et al., 2017, Machlin et al., 2019; McLaughlin et al., 2016; Milojevich et al., 2019; Pollak et al., 2000; Weissman et al., 2019) including in systematic reviews (McLaughlin et al., 2019). These affective pathways have repeatedly been shown to be a key mechanism linking experiences of threat with both internalizing and externalizing psychopathology (Heleniak et al., 2016; Kim & Cicchetti, 2010; Weissman et al., 2019; 2020). Deprivation, in contrast, is proposed

to primarily influence neurocognitive processes, including language and executive function development. Ample evidence supports the association between deprivation, and disparities in children's language and executive function, as well as differences in the structure and function of the neural networks that support these abilities, such as the frontoparietal network (Lambert et al., 2017; Machlin et al., 2019; Miller et al., 2018; 2021; Sheridan et al., 2017). A recent meta-analysis confirms that the associations of deprivation with executive functions are significantly larger than for threat (Johnson et al., 2021). These alterations in neurocognitive development have been shown to mediate the association of deprivation with both externalizing psychopathology and impaired academic performance (Lurie et al., 2021; Miller et al., 2018; 2021; Rosen et al., 2018; 2020).

Many existing mechanisms linking childhood adversity with academic performance and psychopathology—such as elevated emotional reactivity, difficulties with executive function, and other altered neurodevelopmental processes—are complex and challenging to target with interventions. Here, we focus on a previously untested potential mechanism that may be easier to modify with brief, scalable interventions: growth mindset. Growth mindset is an implicit theory that personal characteristics are malleable and can be developed; in contrast, fixed mindset is the belief that personal characteristics are unalterable (Dweck, 1990). Early empirical work examining growth and fixed mindsets focused primarily on children's beliefs about their intelligence as it relates to achieving goals, although subsequent work has applied the construct to other domains such as emotion (Tamir et al., 2007) and personality (Yeager et al., 2014). Mindsets influence how children pursue goals, interpret setbacks to achieving goals, and seek out support in service of those goals (Dweck, 1990; Dweck & Leggett, 1988). For example, children high in growth mindset of intelligence tend to set goals that emphasize learning and developing their abilities and tend to believe their level of effort contributes to achieving desired outcomes even when facing setbacks (Blackwell et al., 2007; Dweck, 1990; Dweck & Leggett, 1998). Conversely, children high in fixed mindset tend to emphasize performance goals that demonstrate their existing abilities and tend to attribute failure or difficulties attaining a desired outcome to low ability (Blackwell et al., 2007; Elliot & Dweck, 1988; Stipek & Gralinski, 1996).

Growth mindset has been linked to academic performance in children and adolescents in numerous studies, making it a promising target for interventions aimed at reducing adversity-related disparities in academic outcomes. Children and adolescents with greater growth mindset achieve higher grades than their peers with greater fixed mindset (Costa & Faria, 2018; Romero et al., 2014; Stipek & Gralinski, 1996), due in part to their willingness to persist when they face difficulties and to seek academic experiences that challenge their abilities (Blackwell et al., 2007; Romero et al., 2014; Yeager et al., 2016). Evidence from large, randomized control studies supports a causal relationship between growth mindset and academic performance, such that youth who were assigned to receive a growth mindset intervention achieved higher grades than controls, especially among the lowest performing students and schools (Paunesku et al., 2015; Yeager et al., 2016; 2019). Emerging evidence suggests that growth mindset may also influence risk for psychopathology, particularly internalizing symptoms (Shleider et al., 2015). Greater growth mindset has been associated with lower symptoms of depression and anxiety among adolescents in several studies (Da Fonseca et al., 2009; Schleider & Weisz, 2016b, Schleider et al., 2015). These findings

are consistent with theoretical perspectives and empirical support that a predisposition for attributing negative events to internal, stable, and global factors may increase risk for internalizing psychopathology (Abela & Hankin, 2009; Gibb & Alloy, 2006; Rose & Abramson, 1992).

Notably, the degree to which one exhibits growth mindset can vary across domains (e.g., about one's intelligence versus personality) and have different functional consequences (Dweck et al., 1995; Hughes, 2015). Most mindset interventions have targeted mindsets and outcomes within the same domain (e.g., intelligence mindsets and academic achievement; Paunesku et al., 2015; Yeager et al., 2016; 2019). The present study examined intelligence growth mindset not only as it relates to domain-relevant academic functioning, but also internalizing symptoms. Little is known about how growth mindset in one domain may impact functional outcomes in another domain in adolescence, and though intelligence mindsets may not be the strongest predictor of internalizing symptoms (Schroder et al., 2015; 2016), other studies have observed an association across these domains (Da Fonseca et al., 2009; Schleider et al., 2015).

Here we evaluate whether experiences of adversity involving threat and deprivation are associated with growth mindset, and whether growth mindset serves as a mechanism linking adversity with academic achievement and internalizing psychopathology. Why might threat and deprivation be associated with growth mindset? Motivation theories propose that individuals are more likely to invest effort in domains where they believe that they can succeed and where their ability can be developed (Wigfield & Eccles, 2000). Indeed, these theories are consistent with evidence that youth with greater growth mindset attribute their performance to internal and controllable factors, while youth with greater fixed mindset attribute their performance to external and uncontrollable factors (Blackwell et al., 2007; Schmidt et al., 2017). Children exposed to threat are subject to aversive and harmful experiences that they cannot control, like witnessing or being subjected to interpersonal violence. Experiencing harsh discipline in childhood is associated with external locus of control orientation, the belief that outcomes are determined by external, uncontrollable forces, in adolescence (Ahlin & Lobo Antunes, 2015). Moreover, children who experience verbal victimization are more likely to attribute negative events to stable factors that are out of their control (Gibb et al., 2006; Gibb & Alloy, 2006). Taken together, these findings point to the relevance that adversity experiences involving threat may have in shaping a fixed mindset by altering youths' beliefs about their ability to exert control over and change future outcomes.

In contrast, conceptual models posit that experiences of deprivation resulting from limited stimulating and supportive interactions with caregivers constrain opportunities for associative learning (McLaughlin et al., 2017). In particular, children raised in deprived environments spend considerably less time interacting with caregivers, likely receiving less sensitive and responsive caregiving in response to distress and other bids for attention (Gaudin et al., 1996; Smyke et al., 2007). An inability to reliably elicit caregiving behaviors may influence children's developing understanding of response contingencies, reducing beliefs about their ability to control and influence their environment. Indeed, children exposed to caregiver deprivation in the form of institutional rearing demonstrate blunted

reward-related associative learning in early childhood and adolescence (Sheridan et al., 2018; Wismer Fries & Pollak, 2017). The lack of early contingent caregiving experiences could plausibly influence children's beliefs about how much control they exert over attaining desired outcomes, thus promoting greater fixed mindset.

To date, empirical work examining the association between childhood adversity and growth mindset has primarily focused on associations with socioeconomic status (SES). For example, in a population-representative study in Chile, adolescents from low SES backgrounds exhibited lower growth mindset compared to their high-SES peers (Claro et al., 2016). A recent study in a nationally representative sample of ninth graders in the United States also observed a positive association between SES and growth mindset, and indicated that greater fixed mindset is a potential mechanism underlying the association between SES and academic achievement (Destin et al., 2019). Low socioeconomic status is associated with increased exposure to experiences of both threat and deprivation (Evans, 2004; Johnson et al., 2016), but we are unaware of prior work examining how these forms of adversity relate to growth mindset, or whether growth mindset serves as a potential mechanism contributing to adversity-related disparities in academic and mental health outcomes.

The purpose of this cross-sectional study is to examine the association between childhood adversity and growth mindset. Specifically, in a large sample of adolescents drawn from one timepoint of two longitudinal studies, we investigated growth mindset as a potential mechanism underlying the associations of both threat and deprivation experiences with academic performance and internalizing psychopathology. During adolescence, all youth, but particularly those who have experienced childhood adversity, are at heightened risk for the onset of psychopathology and exhibit declines in school engagement and grades (Eccles et al., 1993; Fredricks et al., 2004; McLaughlin et al., 2012). It is thus a critical developmental period during which to better understand individual differences contributing to academic and mental health outcomes that can have enduring consequences. First, we hypothesized that both threat and deprivation would be associated with lower growth mindset. Second, consistent with previous findings, we hypothesized that lower growth mindset would be associated with worse academic performance and greater internalizing symptoms. Finally, we hypothesized that reduced growth mindset would mediate the association between experiences of threat and deprivation with both poor academic performance and internalizing symptoms.

Methods

Participants and Procedures

Measures of growth mindset were collected simultaneously at a single timepoint in two ongoing longitudinal studies of youth and their parents being conducted in the lab of the senior author (KM). We collected these measures based on a funding opportunity by the Mindset Scholars Network, which is supported by the Raikes Foundation. Across both studies, a total of 408 children (46.3% female) completed the mindset measures that form the basis of the current report, as well as measures of threat, deprivation, academic performance, and internalizing psychopathology. Both studies involved samples that were recruited from the Seattle area. All procedures were approved by the University

of Washington Institutional Review Board. Written informed consent was obtained from legal guardians and children provided written assent. See Table 1 for sociodemographic characteristics of the sample.

Of the total 408 participants, 192 (108 male, 84 female) were drawn from a longitudinal study investigating associations between maltreatment, emotion regulation, and psychopathology. Youth and their caregivers were recruited between January 2015 to July 2017 when youth were 8–16 years of age. Exclusion criteria included the presence of a pervasive developmental disorder assessed via parent report during first visit, IQ < 80, active psychotic symptoms, or substance abuse. The current study measures were completed in a subsequent wave of data collection administered approximately 2 years following the first study visit. The participants were 10–18 years of age (M_{age} = 14.13, SD_{age} = 2.75) when they completed the current study measures.

The remaining 216 participants (111 male, 105 female) and their caregivers were drawn from a longitudinal study examining the effects of income on the development of effortful control that has followed children (n = 306) and their mothers from age three years (Lengua et al., 2015). Families were recruited with the objective of equal representation across income levels based on federal poverty guidelines in place in 2009–2010. Exclusion criteria for enrollment in the study included diagnosis of a developmental disability and limited proficiency in English. The current study measures were completed between March 2016 to October 2018 when these children were 10–13 years old (M_{age} = 11.48, SD_{age} = 0.48).

Subjects included in the final analytic sample did not differ from excluded subjects on any measures of interest. Rates of missing data did not exceed 2% for measures of interest. See Supplemental Materials for more details about exclusion and missing data.

Measures

Threat.—Exposure to multiple forms of early-life adversity involving threat were assessed and summed to form a composite threat score that has been used previously (Sumner et al., 2019; Kasparek et al., 2020). Threat experiences included instances of physical abuse, sexual abuse, emotional abuse, domestic violence, and exposure to other instances of interpersonal violence. Threat experiences were assessed through child reports on the Childhood Experience of Care and Abuse interview (CECA; Bifulco et al., 2005), the Childhood Trauma Questionnaire (CTQ; Berstein et al., 1997), and the Violence Exposure Scale for Children-Revised (VEX-R; Raviv et al., 2001). Parent reports came from the Juvenile Victimization Questionnaire (JVQ; Finkelhor, Hamby, et al., 2005) and the UCLA PTSD Reaction Index (PTSD-RI; Steinberg et al., 2013). See Supplemental Materials for scoring details.

Deprivation.—Exposure to multiple forms of early-life adversity involving deprivation were assessed and summed to create a composite score that has been used previously (e.g., Sumner et al., 2019). This composite score included counts based on child reports of physical neglect on the CTQ and emotional neglect on the CECA, as well as parent reports of cognitive deprivation on the Home Observation Measurement of the Environment – Short Form (Mott, 2004), and material deprivation in the form of food insecurity on the U.S.

Department of Agriculture's Food Security Scale (Blumberg et al., 1999). See Supplemental Materials for scoring details.

Growth mindset.—Growth mindset of intelligence was assessed using four items. Three items were taken from a measure used in previous research (Yeager et al., 2016) and one additional was item from the Project for Education Research that Scales (PERTS, 2015; Hanson, 2017). Responses to these items were averaged ($\alpha = 0.80$) to form an index where higher scores indicated greater growth mindset and lower scores indicated more fixed mindset. See Supplemental Materials for item details.

Academic Performance.—Academic performance was assessed using parents' responses on the School Problems scale of the Child Behavior Check List (CBCL; Achenbach, 1991). The School Problems scale includes parent reports of their child's performance in four academic subjects (Reading, English, or Language Arts; History or Social Studies; Arithmetic or Math, and Science) rated on a four-option response scale (Failing, Below Average, Average, and Above Average) as well as three questions regarding whether their child has repeated a grade, participated in a remedial class, or experienced any other academic-related problems. The age- and sex-standardized T-score for the School Problems scale was used as the metric of academic performance.

Depression symptoms.—Depressive symptoms were assessed with participants' responses to the 28-item Children's Depression Inventory—Second edition, a widely used measure of depression symptoms in children and adolescents (CDI-2; Kovacs, 2011). Responses were summed to form a composite score of depressive symptoms ($\alpha = 0.89$).

Anxiety symptoms.—Anxiety symptoms were assessed with participants' responses to the 41-item Screen for Child Anxiety Related Emotional Disorders, a common measure of anxiety symptoms in children and adolescents (SCARED; Birmaher et al., 1997). Responses were summed to form a composite score of anxiety symptoms ($\alpha = 0.93$).

Income-to-Needs Ratio

The income-to-needs ratio was calculated to characterize the SES of this sample. See Supplemental Materials for further details of how this variable was calculated.

Statistical Methods

All analyses were completed in SPSS version 28 (IBM Corp, Armonk, NY, USA). First, we examined associations of the dimensional measures of threat and deprivation with academic performance and internalizing symptoms using multiple linear regression. Second, we examined the association of threat and deprivation composites with growth mindset. Third, we investigated whether growth mindset was associated with each of our primary outcomes—academic performance and symptoms of anxiety and depression. Lastly, we tested indirect effects of adversity on outcomes via growth mindsets by computing bias-corrected 95% confidence intervals for 5,000 bootstrapped samples using PROCESS (Hayes, 2017). Indirect effects were estimated for all models, regardless of whether all paths were significant, based on recommendations that mediation effects should be tested even in the

absence of direct effects (Hayes, 2009; MacKinnon et al., 2007). Age and sex were included as covariates in all analyses. Additionally, paths involving adversity were first estimated for threat and deprivation separately, then by a model that included both threat and deprivation to examine unique contributions. This approach has been recommended (e.g., McLaughlin, 2020; McLaughlin & Sheridan, 2016) and used previously (e.g., Sumner et al., 2019) for examining whether the associations of adversity with developmental outcomes are general or specific to certain types of adversity. We applied the false discovery rate (FDR) procedure at the level of the hypothesis to correct for multiple comparisons.

Computing studentized deleted residuals for each model indicated that there were four and six potential outliers greater than three standard deviations from the mean in the two models examining the association between growth mindset with anxiety and depression symptoms, respectively. The pattern of results was unchanged when potential outliers were excluded from each model (see Supplemental Materials for more detail).

Results

Descriptive Statistics

Means, standard deviations, and bivariate correlations for all study variables are presented in Table 2.

Childhood Adversity, Academic Performance, and Internalizing Psychopathology

Greater exposure to experiences of threat was associated with worse academic performance, $\beta = -.41$, $p < .001$, and higher symptoms of anxiety, $\beta = .27$, $p < .001$, and depression, $\beta = .37$, $p < .001$. These associations all remained statistically significant after controlling for co-occurring deprivation, $\beta s > |.29|$, $ps < .001$. Similarly, deprivation was also associated worse academic performance, $\beta = -.36$, $p < .001$, greater symptoms of anxiety, $\beta = .12$, $p = .02$, and depression, $\beta = .29$, $p < .001$. However, after controlling for co-occurring threat only the associations of deprivation with academic performance, $\beta = -.21$, $p < .001$, and depression symptoms, $\beta = .13$, $p = .02$, remained significant. The association between deprivation and anxiety was no longer significant when accounting for threat, $\beta = -.03$, $p = .60$. See the Multiple Regression Models section of Supplemental Materials for detailed parameters for these statistical models.

Childhood Adversity and Growth Mindset

Experiences of both threat, $\beta = -.24$, $p < .001$, and deprivation, $\beta = -.20$, $p < .001$, were negatively associated with growth mindset when examined independently. When examined simultaneously, threat remained associated with growth mindset with little change in the effect size, $\beta = -.18$, $p = .002$ (Figure 1A), but the magnitude of association between deprivation with growth mindset was reduced by more than half and was no longer significant, $\beta = .10$, $p = .085$ (Figure 1B).

Growth Mindset, Academic Performance, and Internalizing Psychopathology

Greater endorsement of growth mindset was associated with better academic performance, $\beta = .22$, $p < .001$ (Figure 2A), and fewer symptoms of both anxiety, $\beta = -.19$, $p < .001$ (Figure 2B), and depression, $\beta = -.16$, $p < .001$ (Figure 2C).

Indirect effects

A significant indirect effect of threat via growth mindset was found for both academic performance, b = −.09, 95% CI [−0.199, −0.009], and anxiety symptoms, b = .16, 95% CI [0.015, 0.371] (Figure 3). Lower growth mindset accounted for about 9% of the effect of threat on higher levels of anxiety symptoms and about 8% of the effect of threat on lower academic performance. The indirect effect of threat on depression symptoms through growth mindset was not significant, b = 0.5, 95% CI [−0.010, 0.125]. There were no significant indirect effects of deprivation through growth mindset on academic performance, b = −.12, 95% CI [−0.359, 0.006], anxiety symptoms, b = .19, 95% CI [−0.007, 0.6], or depression symptoms, b = .06, 95% CI [−0.009, 0.217].

Discussion

Here we examine a novel potential mechanism—growth mindset—underlying the associations of childhood adversity experiences involving threat and deprivation with both academic performance and symptoms of internalizing psychopathology. The present cross-sectional study is the first to our knowledge that examines how diverse forms of childhood adversity are related to growth mindset. We demonstrate that greater experiences of threat and deprivation are negatively associated with growth mindset of intelligence. When accounting for co-occurring adversity in the same model, only threat was associated with lower endorsement of growth mindset. Consistent with previous work, greater endorsement of growth mindset was associated with better academic performance and lower levels of both anxiety and depression symptoms. Finally, lower growth mindset mediated the association between threat with both poor academic performance and greater anxiety symptoms when controlling for deprivation. Taken together, these findings contribute to an emerging body of research supporting growth mindset as a modifiable mechanism that could be targeted to reduce adversity related disparities in academic achievement and internalizing psychopathology.

Trauma Exposure and Growth Mindset

We provide novel evidence that childhood adversity—particularly experiences of threat—is associated with a more fixed mindset. These findings suggest that exposure to violence may lead children to develop beliefs that their efforts are unlikely to produce meaningful changes in their ability to achieve desired outcomes. One possible explanation for this pattern is that exposure to trauma contributes to a perceived lack of control. Exposure to violence in childhood is often associated with changes in attributions, appraisals, and beliefs about oneself and others, including that the world is a dangerous place, that other people cannot be trusted, self-blame for negative events, as well as helplessness and a perceived lack of control over one’s environment (Brown & Winkelman, 2007; Mannarino & Cohen, 1994; 1996). Feelings of helplessness and beliefs about the inability to control important aspects

of one's life may contribute to a more fixed mindset among children who have experienced trauma. Indeed, the effectiveness of mindset interventions appears to be partly explained by enhancing perceptions of control (Schleider & Weisz, 2016b; Schmidt et al., 2017). Taken together, these patterns suggest that adversity experiences involving threat may be associated with lower endorsement of growth mindset because these experiences influence perceptions of control. Here, we tested these beliefs specifically in relation to mindsets about intellectual abilities. Whether a more fixed mindset among children exposed to trauma extends to other life domains, like personality or emotions, is an important question for future research.

Mindset Domain Specificity

Greater growth mindset was positively associated with academic performance, consistent with a wealth of previous research (Blackwell et al., 2007; Claro et al., 2016; Destin et al., 2019; Paunesku et. al., 2015; Yeager et al., 2016; 2019). Growth mindsets were also found to be negatively associated with symptoms of depression and anxiety. Some prior studies have also reported that higher growth mindset is associated with lower symptoms of depression and anxiety (Miu & Yeager, 2015; Schleider & Weisz, 2016b; Yeager, Miu, et al., 2013), although these studies examined the link between mindsets related to personality and psychopathology, whereas the current study assessed mindsets related to intelligence. The association between psychopathology and intelligence mindsets may have received less attention because mindsets are considered domain-specific and are theorized to be most strongly related to constructs within the same domain (Dweck et al., 1995; Hughes, 2015). Indeed, several studies in young adults have shown that beliefs about the malleability of mental health symptoms are more strongly associated with anxiety and depression symptoms than intelligence mindsets (Schroder et al., 2015; 2016). However, intelligence mindsets have been shown to predict constructs conceptually similar to anxiety symptoms, such as perfectionism (Schroder et al., 2015). Moreover, a recent meta-analysis found that greater fixed mindsets across domains of intelligence, personality, and peer relationships are associated with higher levels of youth internalizing problems with no significant moderation by mindset domain (Schleider et al., 2015). Thus, the current finding of an association between intelligence mindsets and psychopathology symptoms not only contributes to the growing knowledge of similarities in the functional consequences of mindsets across domains in children and adolescents, but also has practical value because it suggests that interventions targeting intelligence mindsets could potentially be used for dual purposes—both to bolster academic performance and to reduce internalizing symptoms.

Mindsets as Intervention Targets

Perhaps most importantly, the current study found significant indirect effects, albeit small in magnitude, for adversity involving threat on both academic performance and anxiety via growth mindsets. This mediating role of growth mindsets suggests that readily available and relatively brief mindset interventions (Blackwell et al., 2007; Paunesku et al., 2015; Schleider & Weisz, 2016b; Yeager et al., 2016) are a potentially promising strategy to help mitigate the well-established negative consequences of threat-related adversity on academic performance and internalizing symptoms. Interventions targeting mindsets have garnered much attention for their cost-effectiveness and scalability (Paunesku, et al., 2015; Yeager et al., 2014). These interventions target implicit beliefs about the malleability of

human characteristics. Although most mindset interventions focus on the malleability of intelligence (Blackwell et al., 2007; Good et al., 2003; Paunesku et. al., 2015), other interventions have been designed to target beliefs about the changeability of characteristics beyond intelligence, such as personality (Schleider & Weisz, 2016b; Yeager, Miu, et al., 2013; Yeager, Trzesniewski, et al., 2013). Notably, mindset interventions are brief (< 1 hour) and are delivered with standardized materials (Miu & Yeager, 2015; Yeager et al., 2014; Yeager et al., 2019), making them ideal for widespread implementation.

Despite their brevity, mindset interventions are potent because they target belief systems that elicit positive recursive cycles (see Yeager & Walton, 2011). Relatively brief mindset interventions have been shown to have positive effects on both academic achievement (Paunesku et. al., 2015; Sisk et al., 2018) and mental health (Miu & Yeager, 2015; Schleider & Weisz, 2016b; Yeager, Miu, et al., 2013; Yeager et al., 2014). Notably, recent meta-analyses reveal substantial heterogeneity in the effects of mindset interventions, with effects most pronounced for students who were academically at-risk or socioeconomically disadvantaged (Sisk et al., 2018). Determining whether such interventions have similarly positive effects for children who have experienced violence is a critical question for future research, given the potential for these relatively brief interventions to have wide-reaching positive consequences across numerous developmental domains.

Limitations

Several limitations to the present study should be acknowledged. First, associations between growth mindset with academic performance and internalizing symptoms were examined cross-sectionally. While there is ample longitudinal evidence indicating that growth mindset predicts academic performance (Blackwell et al., 2007; Yeager et al., 2016; 2019), the directionality of the association between growth mindset and internalizing psychopathology is less well-established. One longitudinal study found that higher levels of baseline internalizing symptoms predicted greater fixed mindset related to thoughts, emotions, and behaviors over time in a small sample of adolescents, but greater fixed mindset at baseline did not predict increases in internalizing symptoms (Schleider & Weisz, 2016a). Furthermore, caution is warranted in interpreting mediation findings in this study given the importance of establishing temporal precedence in mediation models (Maxwell & Cole, 2007). Future studies should examine the longitudinal associations between childhood experiences of threat and deprivation, growth mindset, and educational and mental health outcomes.

Second, we relied on parent report of youth academic performance rather than academic assessments or records. Maternal ratings of academic performance, though potentially slightly inflated, are highly correlated with children's actual grades (Maguin & Loeber, 1996). Moreover, previous studies have consistently demonstrated associations between childhood adversity and mindsets related to intelligence with direct measures of youth academic achievement, like grades or performance on achievement assessments (Claro et al., 2016; Destin et al., 2019; Lansford et al., 2002; Sirin, 2005; Yeager et al., 2016; 2019). Nevertheless, future studies examining the effect of adversity-related differences in growth mindset on academic achievement should directly assess children's academic performance.

Finally, we acknowledge that the present study's approach does not allow us to examine how adaptation following adverse experiences may buffer against negative academic and mental health outcomes. Stress-adapted youth demonstrate specialized and enhanced skills because of their experiences in harsh, unpredictable environments which are not showcased in low adversity contexts (see Ellis et al., 2017 for a review). Future studies could take a strengths-based approach to examine how youth may cultivate growth mindset in the context of early-life adversity and whether this may help to prevent the emergence of academic and mental health problems.

Conclusions

This study suggests that early-life adversity—particularly experiences of threat—may contribute to the emergence of a fixed mindset. Furthermore, it provides promising support for the role of fixed mindset in the associations of threat-related adversity with both academic performance and internalizing symptoms. These findings may have great practical value, as they suggest that readily available growth mindset interventions are a potentially promising approach to mitigating some of the negative consequences of early-life adversity, which affects a substantial proportion of children and adolescents.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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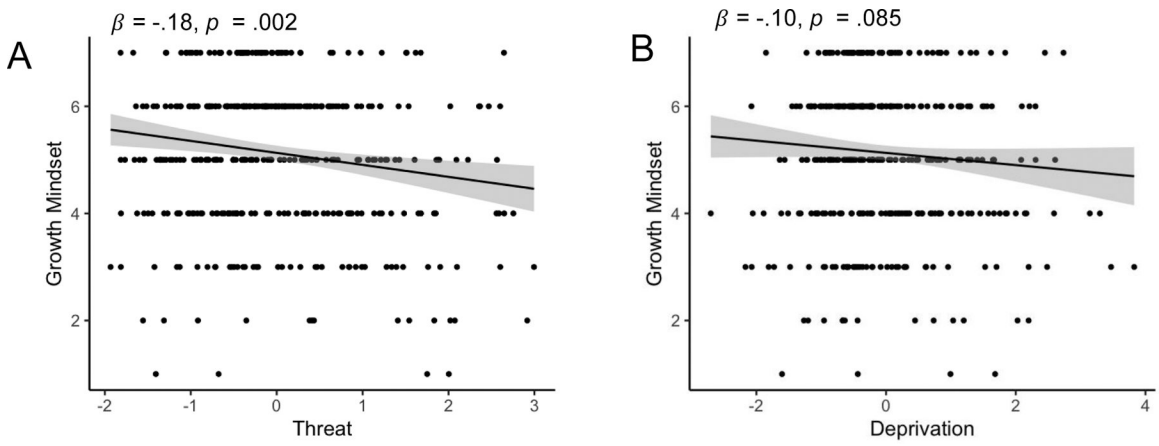

Figure 1.

Associations between experiences of threat with growth mindset, controlling for deprivation, age, and sex (A), and between experiences of deprivation with growth mindset controlling for threat, age, and sex (B).

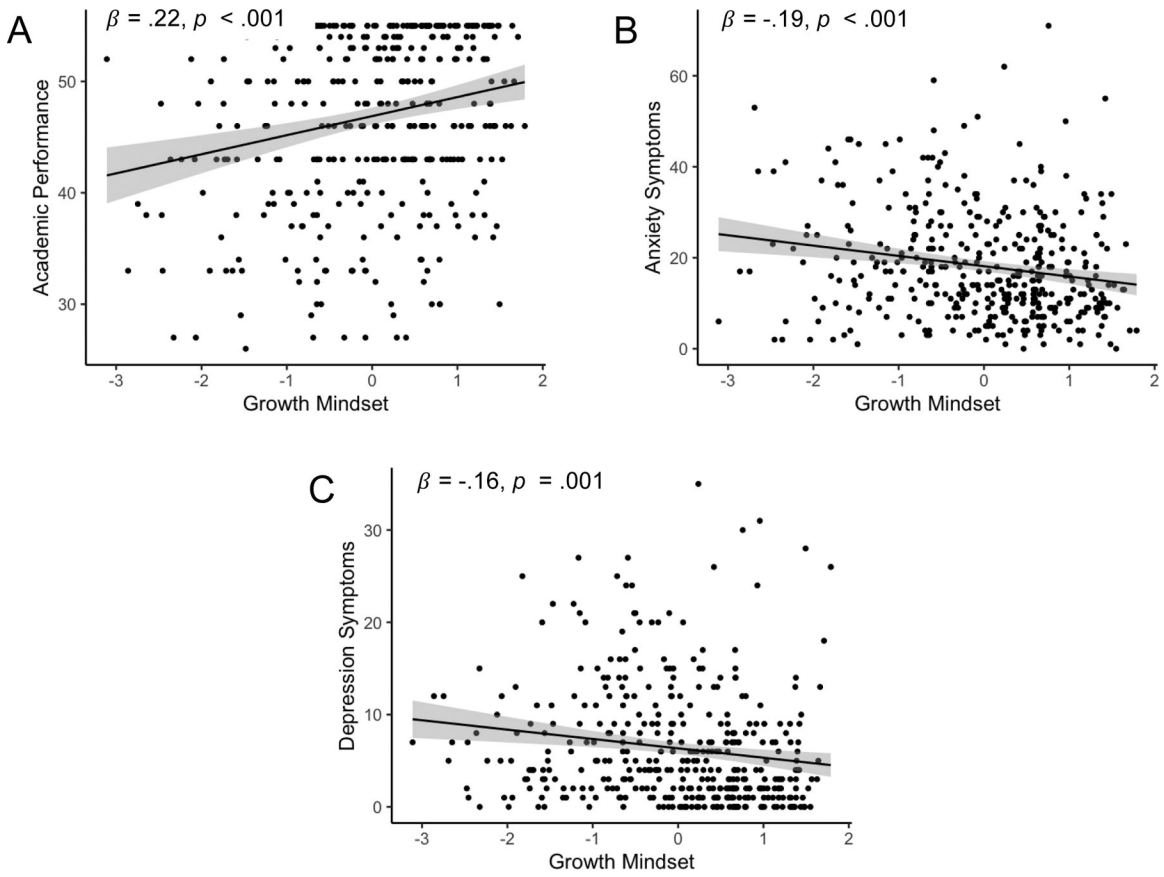

Figure 2.

Associations between growth mindset and youths' academic performance (A), anxiety symptoms (B), and depression symptoms (C) controlling for age and sex.

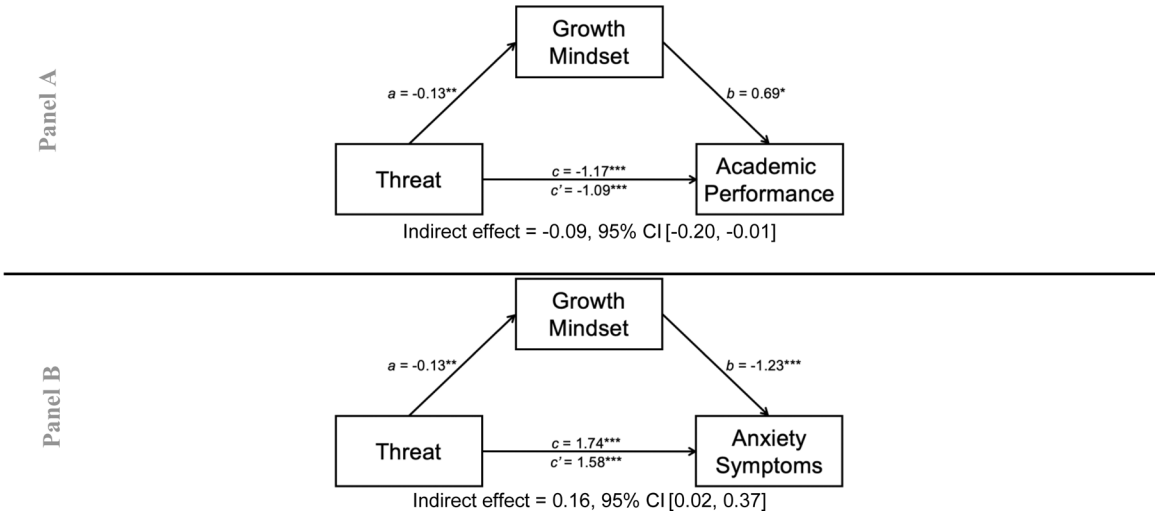

Figure 3.

Lower growth mindset mediated the association between threat with both academic performance (A) and anxiety symptoms (B).

Note. Controlling for sex, age, and deprivation.

* $p < .05$

** $p < .01$

*** $p < .001$

Table 1

Socio-demographics of the study sample

Characteristics	n (%) or value
Sex	
Male	219 (53.7%)
Female	189 (46.3%)
Race & Ethnicity	
Asian	39 (9.6%)
Black	79 (19.4%)
Latino	44 (10.8%)
Other	29 (7.1%)
White	216 (52.9%)
Not reported	1 (<1%)
Income-to-Needs Ratio	
Minimum	0.089
Maximum	10.35

Table 2

Means, standard deviations, and correlations of study variables

Variables	*Mean*	*SD*	Correlations								
			1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**
1. Sex	0.46	0.49	--								
2. Age	12.72	2.33	.04	--							
3. Threat	0.88	1.97	−.07	**.33**	--						
4. Deprivation	0.67	0.9	−.03	**.28**	**.59**	--					
5. Growth Mindset	5.02	1.39	.03	**−.12**	**−.26**	**−.22**	--				
6. Academic Performance	46.89	7.94	.09	.04	**−.35**	**−.33**	**.21**	--			
7. Depression Symptoms	6.35	6.44	−.01	**.34**	**.44**	**.36**	**−.20**	**−.23**	--		
8. Anxiety Symptoms	18.15	11.92	.05	.07	**.26**	**.13**	**−.20**	**−.15**	**.59**	--	
9. Income-to-Needs Ratio	3.66	2.21	.08	.02	**−.35**	**−.41**	**.15**	**.25**	**−.15**	−.09	--

Note. Coefficients printed in bold are significant ($p < .05$). Sex was coded as 0 = male, 1 = female.