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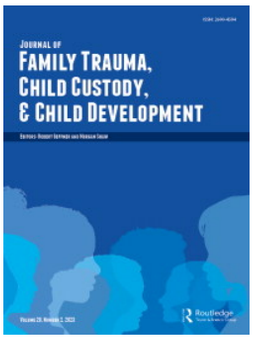

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Early adversity and emotional awareness: A partial confirmation and extension of their relationship

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ABSTRACT

Early adversity has been consistently linked to mental health outcomes, but the underlying pathways remain unclear. One previous study found an association between early adversity and trait emotional awareness (EA), which has itself been linked to health outcomes, but links to mental health were not explicitly examined. The aim of the current study was to test the hypothesis that the association between early adversity and health can be partially accounted for by differences in EA within a large student sample ($n = 196$). Participants completed measures of early adversity, EA, and current emotional functioning (i.e., depression, anxiety, somatization, positive/negative affect). Bayesian analyses found the most evidence for models with an interaction between sex and early adversity in predicting emotional functioning—revealing the expected negative relationship between early adversity and EA in females, but a positive relationship in males. Early adversity, but not EA, was associated with depression, anxiety, and implicit negative affect. Only explicit positive affect was associated with both early adversity and EA, and EA partially mediated the negative association between early adversity and positive affect. These results provide limited support for EA as a mediating pathway for the effects of early adversity on mental health.

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Introduction

Early adversity has been associated with decreased physical and mental health outcomes (Felitti et al., 1998; McLaughlin, 2016). While early

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adversity is defined in many ways, it typically encompasses harmful events or effects upon a child's physical environment (e.g., poor housing conditions, lack of necessary medical care), psychosocial context (e.g., verbal abuse or neglect, or both [e.g., sexual or physical abuse]; Nelson & Gabard-Durnam, 2020). Nelson and Gabard-Durnam (2020) further conceptualize adversity as any violation of what is anticipated or reasonably expected in one's environment. Specifically, when early adversity is measured retrospectively, it often covers five types of violations: emotional abuse, physical abuse, sexual abuse, emotional neglect, and physical neglect (Schmidt et al., 2020). The Adverse Childhood Experiences Study (ACEs; Felitti et al., 1998) laid considerable groundwork in revealing the impact of abuse and neglect on future health risk behaviors and disease. The ACEs questionnaire has been widely used by medical and psychosocial researchers over the past two decades to expand understanding of risk and protective factors related to early adversity (Zarse et al., 2019). For example, research has shown that greater ACEs are a predictor of poor mental health in adults, leading to higher anxiety, stress, and depression, as well a higher likelihood of being diagnosed with a mental illness (Crandall et al., 2019; Mwachofi et al., 2020). Early adversity has also been associated with poorer academic and career achievement, including both lower rates of attaining higher education (Hardner et al., 2018; Romano et al., 2015) and lower socio-economic status in adulthood (Suglia et al., 2022).

Despite extensive work on early adversity, there is less research examining pathways linking it to decreased health in adulthood. Identifying potential pathways could guide the development of interventions that protect against negative consequences of early adversity (McLaughlin, 2016). One proposed pathway is through various aspects of emotion processing (Repetti et al., 2002; Taylor et al., 2011), such as interoception, emotion recognition, and emotion regulation, among others (Smith et al., 2018). Research indicates a negative family environment can cause alterations in specific aspects of emotion processing. For example, evidence suggests maltreated children, compared to their non-maltreated peers, show greater neural responses to angry faces (Cicchetti & Curtis, 2005). Physically abused children have an attentional bias toward angry expressions (Pollak et al., 2000), require less sensory input to detect anger (Pollak & Sinha, 2002), and are slower to disengage from angry faces (Pollak & Tolley-Schell, 2003). Moreover, institutionalized children show reduced processing of emotional expressions (Moulson et al., 2009); neglected children have greater difficulty distinguishing expressions of emotions (Pollak et al., 2000); and abused children are less accurate in emotion recognition (Camras et al., 1988). Furthermore, individuals who have experienced early adversity in childhood self-report greater emotional reactivity (Heleniak et al., 2016) and poorer emotion regulation later in

life (Tottenham et al., 2010). These findings suggest emotion processing issues can result from early adversity and lead to effects later in life. Still, research on other aspects of emotion processing is needed.

One under-examined aspect of emotion processing is trait emotional awareness (EA)—an individual's ability to be aware of the emotional states of self and others (Lane & Schwartz, 1987; Smith et al., 2018). EA is posited to be a central skill interlinking emotion perception and regulation abilities, as reflective understanding of the emotions perceived in self and others may be necessary to guide goal-directed cognition and behavior (Smith et al., 2018). For example, without being aware that one is sad, it may be difficult to identify the source of one's sadness or plan a course of action to feel better. As such, higher levels of EA are recognized to be important for understanding and regulating emotions (Lane, 2000). Lower EA has also been linked to several physical and mental health conditions (e.g., Lackner, 2005; Levine et al., 1997). Thus, if early adversity hindered the development of EA, this could provide a pathway whereby it can interfere with healthy functioning in adulthood.

Because EA is thought to develop from early socio-emotional interactions with caregivers, early adversity could limit opportunities to learn about emotions or detrimentally alter the nature of what is learned (Smith et al., 2019; Sroufe, 1997). More specifically, this could occur if caregivers fail to attend to a child's affective responses, label those responses with emotion words (i.e., allowing emotion concept acquisition), or respond to their associated needs (Gergely & Watson, 1999). A child lacking parental feedback may not learn these skills and thus struggle to self-monitor and self-regulate. Indeed, less responsive/reflective parenting has been associated with emotional problems in children (Camoirano, 2017). In abusive environments, a child might benefit from diverting attention away from emotional experiences because attending to such emotions might be too distressing (Lane et al., 2015). In this manner, there may be a protective element in focusing on another's emotional state over one's own; however, what may have been adaptive in childhood could become a barrier in later social situations as an adult. Research has shown that children who grew up in conflictual families have a tendency to escape stressful situations to reduce their tension (O'brien et al., 1991). Further, by not talking about the traumatizing event, a child may not receive support or comfort from caregivers to adequately attend to and process the emotional experience. Ultimately, this could result in a decreased ability to self-monitor and be aware of one's emotions (Lane et al., 2015). Together, these findings predict impairment in EA within the context of early adversity.

Partial support for the hypothesis that early adversity leads to an impairment in EA was documented in a study by Herrmann et al. (2018), which

found that, relative to healthy controls, EA scores were lower in an inpatient psychiatric sample in whom 62% had early adversity. However, EA scores did not differ between patients rated as having clinically significant vs nonsignificant levels of abuse. Another study also observed patients with borderline personality disorder—frequently associated with early adversity (Levine et al., 1997)—had lower EA than healthy controls (Widom et al., 2009). Furthermore, cross-sectional and longitudinal studies have shown institutionalization in childhood—generally characterized by higher levels of social deprivation—can result in poor performance on mental state recognition tests (Colvert et al., 2008; Yagmurlu et al., 2005). Exposure to maltreatment in childhood has also been associated with greater self-reported difficulties in identifying/describing feelings; this association remained significant when controlling for depressive/anxious symptoms (Brown et al., 2016; Smith & Flannery-Schroeder, 2013). Yet, two other studies failed to find associations between childhood maltreatment and reflective functioning in adulthood (Ensink et al., 2014; Stacks et al., 2014).

Following on this prior body of research, one recent study found a relationship between EA and early adversity in a college student sample (Smith et al., 2022), wherein greater early adversity was associated with lower EA (although more consistently across measures in females than males). However, the focus was not on psychopathology and the study did not collect measures of current emotional health. In order to determine whether reduced EA is a pathway through which early adversity negatively impacts adult functioning, current measures of emotional health should be assessed. If this pathway was confirmed, it could help explain the previously reviewed findings (e.g., higher emotional reactivity and inefficient coping), advance our understanding of the links between early adversity and health outcomes, as well as provide a potential target for intervention. Moreover, individuals with greater EA tend to experience better psychotherapy outcomes (Beutel et al., 2013). Therefore, a better understanding of how EA moderates these outcomes, and how it could itself be targeted in treatment, could be of significant clinical utility.

In the present study, we sought to confirm the association between early adversity and EA and assess whether this relationship could explain individual differences in current emotional functioning. This is particularly important to investigate, given the profound effects that early adversity can have on an individual's life functioning across many domains, as reviewed above. Considering less effective emotion regulation can result in a lasting propensity for negative affect and put individuals at risk for developing psychological disorders (Taylor et al., 2011), we expected individuals exposed to early adversity to report decreased mental health (i.e., anxiety/depressive symptoms), increased negative affect, and decreased positive affect. We also expected this to hold when using measures of

implicit negative/positive affect that do not require explicit reflection on emotions associated with high EA (Allen, 2013). A positive association was expected between early adversity and somatic symptoms, as experiencing abuse in early childhood is a predictor for increased health problems (e.g., Springer et al., 2007), and increases in somatic symptoms appear to be independent of whether or not those symptoms can be explained by a medical condition (Fiddler et al., 2004). We further expected mediation analyses to show EA mediates the relationship between early adversity and measures of current emotional functioning. If confirmed, this would offer additional support that early adversity contributes to negative health outcomes in part by preventing development of EA. Finally, as in the prior study on EA and early adversity described above, we analyze these relationships by sex, due to the well-known differences in EA between females and males (i.e., greater EA in females; Wright et al., 2018) and differences in effects of early adversity on females vs. males (Bath, 2020).

Methods

Participants

The study population consisted of University of Arizona undergraduates who were recruited from December 2016 to October 2017 in an introductory psychology course wherein students participate in psychological research for course credits. A total of 236 participants were recruited. Additional information regarding recruitment can be found in Supplementary Materials.

Materials and procedure

The 10-item, online version of the electronic Levels of Emotional Awareness Scale (eLEAS) was used to measure trait EA. Responses are scored automatically using a procedure described by Barchard et al. (2010). In order to comprehensively assess specific aspects of early adversity—including the different sub-types of abuse and neglect—we used the Childhood Trauma Questionnaire (CTQ; Bernstein et al., 2003) and the Childhood Experiences of Care and Abuse questionnaire (CECA; Bifulco et al., 2005). The CTQ assesses the same domains of maltreatment as the ACEs, but its extended length (28 vs. 5 questions) helps determine frequency of maltreatment and gauge response reliability. For the CECA, respondents rate experiences with their father and mother separately on scales that assess parental antipathy and neglect similarly to domains measured by the ACEs (Bifulco et al., 2005). The seven-item Generalized Anxiety Disorder Scale (GAD-7), nine-item Patient Health Questionnaire (PHQ-9), and 15-item Patient Health Questionnaire (PHQ-15) measured severity of anxiety, depressive

symptoms, and somatic symptoms (respectively) in the past four weeks. The Implicit Positive and Negative Affect Test (IPANAT; Quirin et al., 2009) measured implicit affect. Detailed information on measures and study procedures can be found within Supplementary Materials.

Statistical analyses

Early adversity and emotional awareness

To assess the relationship between early adversity and EA, we adopted a Bayesian statistical approach (for detailed information, see Kruschke, 2014; Yalch, 2016). In this framework, the probability of data under different models (alternative hypothesis) can be directly estimated, including under a null model. This allowed us to test for evidence favoring a null model as opposed to only failing to reject it (as in frequentist approaches). This Bayesian approach also tends to outperform frequentist analyses in small sample sizes and when normality is violated (Kruschke, 2014; Martin & Williams, 2017). We first ran JZS Bayes factor analyses with default prior scales (explained in detail below) in R (BayesFactor package; Morey & Rouder, 2015; Rouder et al., 2012) comparing null (intercept only) regression models predicting LEAS Total scores to the space of regression models that included all combinations of age, sex, CTQ or CECA scale scores, and interactions between sex and CTQ or CECA scores as predictors. For regression models tested, we report Bayes factors, as well as posterior estimates of each coefficient in the best fit models and their credible intervals. For the unfamiliar reader, posterior estimates correspond to the highest probability coefficient value under a model given the data, and credible intervals report the portion of the probability distribution that includes 95% of the values around that estimate. A Bayes factor (BF) compares two models as follows:

$$\mathrm{BF} = \frac{p(d \mid H_1)}{p(d \mid H_0)}$$

Here, indicates the null hypothesis, indicates the alternative hypothesis, and indicates the data. BF = 1 indicates equal evidence for two models, while BF = 3, for example, indicates three times the evidence for the alternative hypothesis than the null hypothesis. When interpreting strength of evidence of findings below, we adopted guidelines described by Lee and Wagenmakers (2014). Namely, BF = 1–3, poor/anecdotal evidence; 3–10, moderate evidence; 10–30, strong evidence, 30–100, very strong evidence, >100, extremely strong evidence.

The default JZS priors used in the BayesFactor package (for details, see Rouder et al., 2012) were developed to allow for a standardized approach

across studies. They are constructed to be consistent and invariant with respect to linear transformations of measurement units, as well as to be computationally convenient and conducive to the use of standard sampling algorithms. In regression, priors placed on the intercept and variance are broad and uninformative, while priors placed on standardized effects are weakly informative in that they place lower probability on extreme and unlikely standardized slopes (also see Rouder et al., 2012). As mentioned above, we incorporate BFs in our analyses because they provide a straightforward basis for model selection and allow evaluation of evidence for the null model as well as models that include any combination of potentially relevant predictor variables.

After confirming these initial results, to better understand the nature of these relationships we performed the same analyses with LEAS Self and Other scores as target variables. As in the prior study described above in Smith et al. (2022), due to well-known sex difference in LEAS scores (Wright et al., 2018) and effects of early adversity (Bath, 2020), we also performed post-hoc contrasts for any significant interactions between sex and CTQ/CECA scores observed in the models to assess whether early adversity impacts EA differentially by sex.

Early adversity, implicit affect, and psychopathology

Pearson correlation analyses examined associations between early adversity and anxious, depressive, and somatic symptoms, and positive and negative affect (implicit and explicit), both for all subjects and separated by sex. The significance of these correlations did not require correction for multiple comparisons, as they were expected based on a large body of previous literature; these were not central hypotheses, but instead a priori assumptions underlying our hypothesis about EA as a mediator. We performed mediation analyses (Baron & Kenny, 1986) for cases in which we observed (1) significant Pearson correlations between early adversity measures (i.e., predictors) and symptom measures/IPANAT (i.e., outcome variables), (2) early adversity measures and EA (i.e., mediators), and (3) EA and symptom measures/IPANAT.

Results

Descriptive statistics

Of the 236 participants recruited, 17 did not complete all questionnaires and 11 were excluded due to being under 18 years of age. Data from 12 participants were excluded based on infrequency responses (see Supplementary Materials); therefore, the final sample consisted of 196 participants (75% female; M_{age} = 19.27 [SD = 3.55]; 55% White). English proficiency of six participants was considered insufficient; their EA data

were excluded. One participant was considered an outlier on implicit positive affect (based on the outlier labeling rule; Hoaglin & Iglewicz, 1987), so these data were not included in analyses. Demographic and clinical characteristics of the final sample are shown in Table 1. Average EA and early adversity scores in the final sample was comparable to other student samples (Barrett et al., 2000; Falgares et al., 2018; Paivio & Cramer, 2004). Females scored higher than males on EA ($t(188) = -2.74$, $p = .007$, BF = 5.37), emotional ($t(159.26) = -3.48$, $p = .001$, BF

Table 1. Demographic and clinical characteristics of the final sample ($n = 196$).

	Males ($n = 49$)	Females ($n = 147$)	Grouped	
	M (SD)	M (SD)	M (SD)	*n*
Demographic and clinical variables				
Age	20.51 (5.85)	18.86 (2.21)	19.27 (3.55)	196
Sex (% female)	–	–	75	196
Ethnicity*				192
Caucasian	27 (55)	78 (54)	105 (55)	
Hispanic or Latino	9 (18)	37 (26)	46 (24)	
Asian	7 (14)	9 (6)	16 (8)	
Black or African American	3 (6)	3 (2)	6 (3)	
Multiracial	2 (4)	14 (10)	16 (8)	
Other	1 (2)	2 (1)	3 (2)	
LEAS total	32.72 (4.52)	34.93 (4.85)	34.39 (4.86)	190
Subscale: Self	27.26 (5.21)	30.24 (4.88)	29.52 (5.11)	
Subscale: Other	26.91 (4.40)	28.08 (4.76)	27.80 (4.69)	
Childhood Trauma Questionnaire (CTQ)				196
Subscale: emotional abuse	7.94 (2.87)	10.07 (5.12)	9.54 (5.07)	
Subscale: physical abuse	6.16 (1.67)	6.98 (3.72)	6.78 (3.35)	
Subscale: sexual abuse	5.14 (0.76)	6.67 (4.28)	6.29 (3.78)	
Childhood Experience of Care and Abuse (CECA)				196
Subscale: mother antipathy	11.08 (5.14)	12.57 (5.98)	12.20 (5.81)	
Subscale: mother neglect	12.55 (5.48)	13.20 (6.06)	13.04 (5.91)	
Subscale: father antipathy	14.29 (5.00)	13.44 (6.54)	13.65 (6.19)	
Subscale: father neglect	17.37 (7.27)	16.78 (8.21)	16.93 (7.97)	
Anxiety symptoms (GAD-7)	6.06 (3.87)	7.69 (4.96)	7.28 (4.76)	196
Depressive symptoms (PHQ-9)	5.77 (4.86)	6.97 (5.41)	6.68 (5.30)	195
Somatic symptoms (PHQ-15)	4.76 (3.53)	7.67 (4.86)	6.94 (4.73)	196
Explicit/implicit affect (IPANAT)				
Explicit positive affect (EPA)	2.04 (0.68)	2.03 (0.80)	2.03 (0.77)	196
Explicit negative affect (ENA)	1.63 (0.63)	1.65 (0.64)	1.64 (0.64)	196
Implicit positive affect (IPA)	1.98 (0.34)	1.96 (0.37)	1.96 (0.36)	168
Implicit negative affect (INA)	1.89 (0.37)	1.87 (0.41)	1.87 (0.40)	169

*Indicated with the number of positive responses (percentage).

Note. The range of scores for each measure is as follows: LEAS total (15–49); LEAS Self (15–40); LEAS Other (11–39); CTQ Emotional Abuse (5–25); CTQ Physical Abuse (5–25); CTQ Sexual Abuse (5–25); CECA Mother Antipathy (5–30); CECA Mother Neglect (8–40); CECA Father Antipathy (5–30); CECA Father Neglect (8–40); GAD-7 (0–21); PHQ-9 (0–27); PHQ-15 (0–25); EPA (1–4); ENA (1–4); IPA (1–4); INA (1–3.11).

= 3.76), physical ($t(177.79) = -2.10$, $p = .037$, BF = .49), and sexual abuse ($t(170.46) = -4.12$, $p < .001$, BF = 2.87), anxiety ($t(104.55) = -2.36$, $p = .020$, BF = 1.30), and somatic symptoms ($t(194) = -4.02$, $p < .001$, BF = 147.63).

Early adversity and emotional awareness

LEAS total scores show opposite associations with emotional abuse in males and females

In a Bayes factor analysis assessing age, sex, and CTQ (and interactions between sex and CTQ) as possible predictors of LEAS Total, the most evidence was found for a model including sex, CTQ emotional abuse, and an interaction between sex and emotional abuse (BF = 20.4 relative to an intercept-only model). The 2nd-best model added sexual abuse (BF = .39 relative to the best model), while the 3rd-best model added physical abuse to (BF = .29 relative to the best model). Separately omitting each variable from the best model revealed emotional abuse and its interaction with sex were the most important variables (BF = .33 and .05 relative to the best model when respectively removed), while omitting sex (i.e., leaving only its interaction with emotional abuse) improved the model (BF = 2.1 relative to the best model above; BF = 42.16 relative to an intercept-only model). This indicates the interaction primarily has explanatory power (note initial model space did not include interaction terms without associated main effects). Posterior regression coefficients for this winning model were as follows: emotional abuse: $b = .34$, 95% CI = [.12 .57]; sex (female)*emotional abuse: b = −0.43, CI = [-0.66 − 0.20]. To interpret this interaction, we examined post-hoc contrasts within the model (i.e., male—female). These revealed that emotional abuse and LEAS Total scores were positively associated in males but not in females: 0.86, CI = [1.3, 0.4]. This interaction can be seen in the scatterplots of male and female scores shown in Figure 1. Analyses to determine if there was a quadratic relationship between EA and early adversity did not reveal significant results.

Details of identical analyses when separately examining LEAS Self and Other are described in Supplementary Materials. These showed a similar (but somewhat stronger) pattern of results for LEAS Self (BF > 100 for a model including sex, CTQ emotional abuse, and an interaction between sex and emotional abuse relative to an intercept-only model; with some evidence for an additional relationship with physical abuse in the 2nd-best model). The pattern of results in males and females underlying these effects can be seen in Figure 1. In contrast, the most evidence was found for the null model when examining LEAS Other.

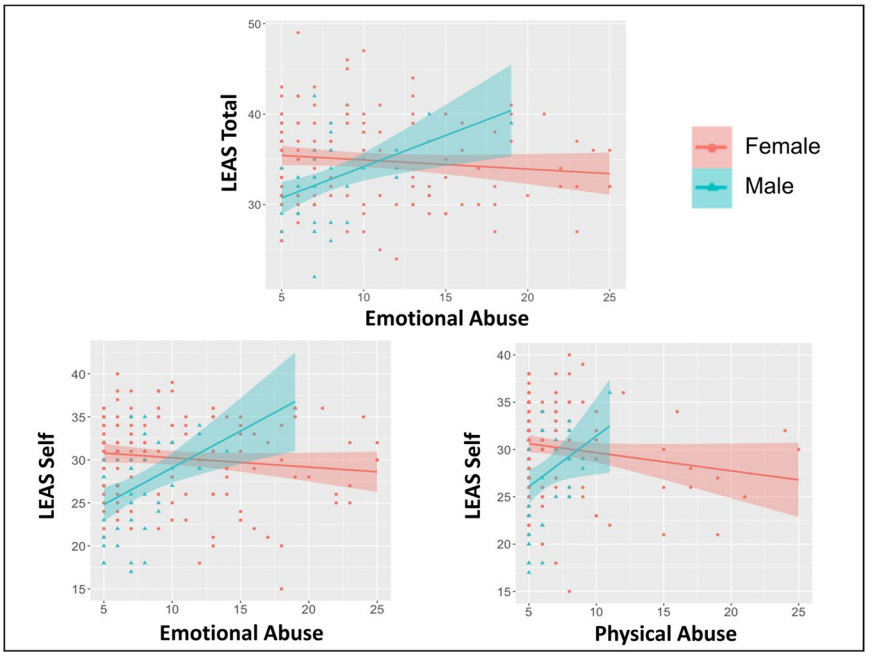

Figure 1. Example scatterplots depicting sex differences in the relationship between emotional awareness (LEAS) scores and early adversity (CTQ) scores indicated by our primary analyses.

LEAS total scores show negative associations with father neglect in females

In a Bayes factor analysis assessing age, sex, and CECA (and interactions between sex and CECA) as possible predictors of LEAS Total, two models had roughly equivalent (moderate) evidence relative to an intercept-only model: sex alone (BF = 5.4) and sex and father neglect (BF = 4.8), with BF = 1.1 for the first compared to the second. A third model added an interaction between sex and father neglect to the second model (BF = 2.1 relative to an intercept-only model). However, when assessing relative importance of variables, we found dropping the main effect of father neglect (while keeping its interaction with sex) resulted in a model with marginally more evidence than the sex-only model (BF = 7.6 relative to an intercept-only model; BF = 1.4 relative to the sex-only model). Posterior regression coefficients for this winning model were as follows: sex (female): $b = 1.03$, 95% CI = [0.26 1.82]; sex (female)*father neglect: $b = -0.088$, CI = [-0.17 – 0.005]. Post-hoc contrasts for this interaction (i.e., male—female) revealed that males had a positive association between CECA father neglect scores and LEAS Total scores, whereas females showed a negative relationship: 0.18, CI = [0.01, 0.34]; see scatterplots in Figure 2.

Details of identical analyses when separately examining LEAS Self and Other are described in Supplementary Materials. These showed most evidence for a model of LEAS Self including sex and an interaction between sex and mother neglect (BF = 82.1 relative to an intercept-only model). The pattern of results

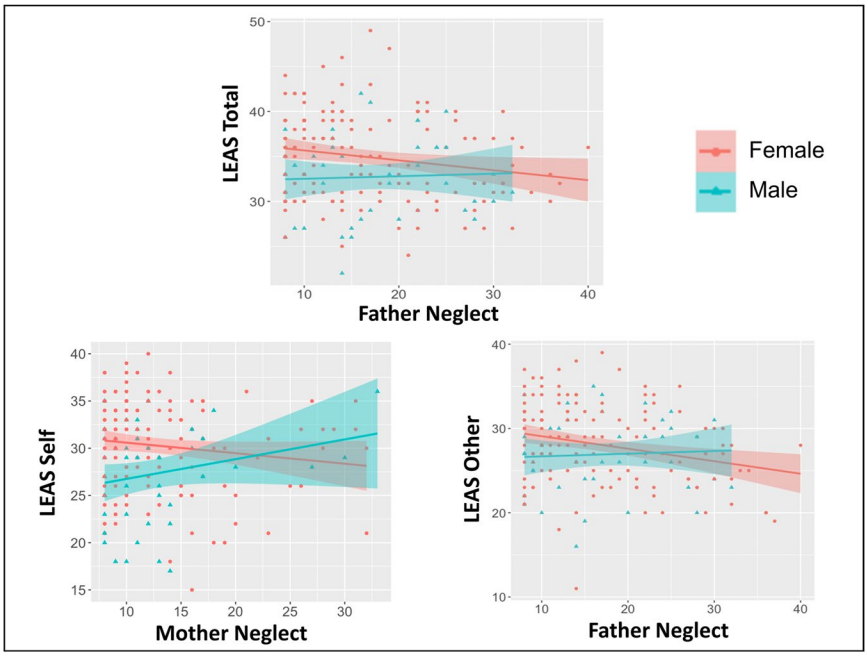

Figure 2. Example scatterplots depicting sex differences in the relationship between emotional awareness (LEAS) scores and early adversity (CECA) scores indicated by our primary analyses.

in males and females giving rise to this interaction, showing a positive relationship in males and a negative relationship in females, can be seen in Figure 2. In contrast, the most evidence was found for a model of LEAS Other including only father neglect (BF = 4.6 relative to an intercept-only model).

Correlations between early adversity, emotional awareness, and emotional symptoms

Correlations showed expected significant positive relationships between each early adversity measure and all emotional functioning measures (PHQ-9, GAD-7, and PHQ-15), as well as positive correlations with explicit negative affect and negative correlations with explicit positive affect (see Figure 3). When examining males alone, some relationships with depression were absent and all relationships with explicit positive affect were absent. Across all subjects, and in females alone, relationships were largely absent between LEAS and both symptom measures and implicit/explicit affect measures. LEAS Other were positively associated with explicit positive affect. In males, LEAS scores showed a pattern of being (numerically) positively correlated with nearly all emotional functioning measures (except for implicit negative affect); correlations were significant for LEAS Self and symptom measures.

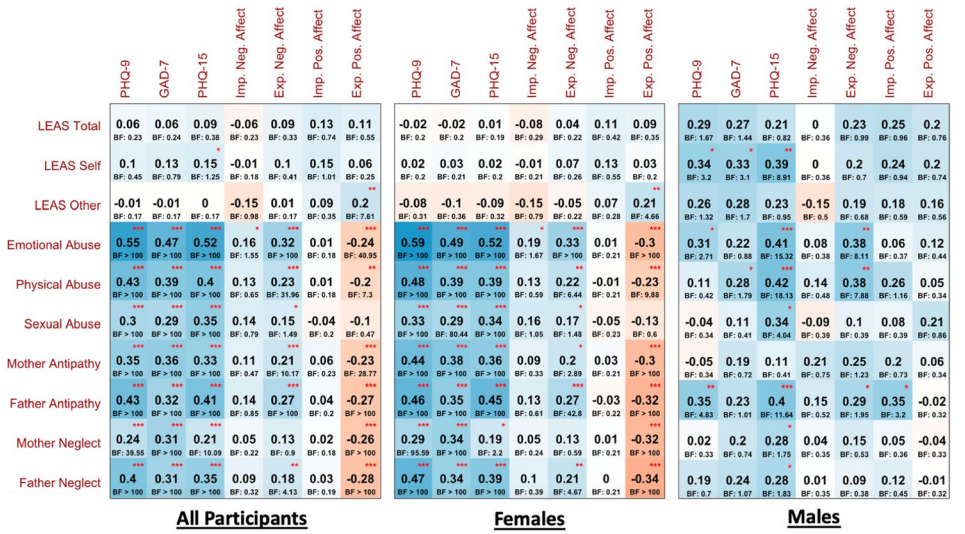

Figure 3. Pearson correlations between emotional awareness (LEAS) scores, early adversity (CTQ and CECA) scores, and emotional functioning measures. For reference, correlations with uncorrected *p*-values are marked with red asterisks: * $p < .05$, ** $p < .01$, *** $p < .001$. However, correlations between early adversity and emotional functioning measures were not central hypotheses that required correction for multiple comparisons; they were expected based on a large body of previous literature and were a priori assumptions underlying our hypothesis about EA as a mediator. As can be seen, these expected relationships between early adversity and emotional functioning were present.

Supplementary mediation analyses

Based on the results above, the possibility of EA as a mediator between early adversity and health outcomes (i.e., anxiety, depression, somatic symptoms) was largely not supported. The only potential candidates for mediation analyses consistent with our general hypotheses were models that considered EA for others as a mediator in the relationship between mother or father neglect and explicit positive affect. Exploratory analyses examining this possibility are shown in Supplementary Materials, which supported partial mediations in both cases (see Figure S1). That is, the relationship between higher neglect and lower explicit positive affect was partially accounted for in each case by differences in EA for others.

Supplementary analysis comparing current and previous samples

The results above did not clearly replicate previous findings (Smith et al., 2022), in which LEAS and early adversity were significantly negatively correlated in females (and in males for some measures). Yet, there was also not strong evidence in Bayesian analyses for models with no relationship between these variables in the current sample when separated by sex (i.e., we found strong evidence for positive associations in males for

emotional abuse, strong evidence for a negative association with father neglect in females, and either poor evidence for or against the null model in other cases). As such, we were interested in assessing possible differences between the current and previous datasets that might account for these inconsistent findings. To that end, we show direct comparisons of the present dataset with that of the previous study of LEAS scores and early adversity in Supplementary Materials (noting here that both samples were students recruited from the University of Arizona). As shown in Tables S1–S3, these samples differed in LEAS Total (higher in current sample), and in both mother and father antipathy on the CECA (greater in previous sample). When comparing samples separately for each sex, this same pattern held for both males and females. However, females also showed marginally greater mother neglect in the current sample and males showed marginally greater sexual abuse in the previous sample. For ease of direct comparison, plots identical to Figures 1 and 2 for data in the previous sample are also presented in Figure S2. For the interested reader, zero-order correlations between all measures are also shown in Supplementary Materials (in similar format to those shown in the prior study).

Discussion

In this study, we aimed to confirm the association between early adversity and EA and assess whether this relationship could explain individual differences in current emotional functioning. A previous study found negative relationships between early adversity and emotional awareness (Smith et al., 2022). However, relationships were somewhat less consistent in males, and the purpose of that study was not to address questions about current emotions and symptoms. In the current study, we sought to further support and extend understanding of the relationship between early adversity, EA, and emotional functioning—aiming to identify risk factors related to emotion that might inform understanding of mechanisms linking early adversity to adverse mental and physical health outcomes.

Broadly speaking, our results provide some additional support for a negative relationship between early adversity and EA in females. However, while we found several significant relationships between specific aspects of early adversity and EA, some findings did not clearly replicate previous results. Namely, the prior study found that EA was negatively associated with physical abuse, sexual abuse, and mother neglect in both males and females; males alone also showed notable positive correlations between EA and emotional abuse/parental antipathy, but these were not significant in the small sample size of males in that study ($N = 40$). In contrast, Bayesian analyses in the present study found evidence for significant sex

differences. Namely, there was strong evidence in females (but not males) for a negative relationship between EA for others and father neglect. Females also more generally showed a consistent pattern of negative associations between EA and early adversity, but only significantly so for parental neglect. As mentioned above, this was broadly consistent with prior findings, but the relationship magnitudes were weaker.

In contrast, Bayesian analyses found strong evidence for a positive relationship between EA and emotional abuse in males, and a similar pattern for physical abuse and mother neglect with respect to self-focused EA; females instead showed opposing negative relationships with each of these variables (as well as father neglect; see Figures 1 and 2). This was consistent with the positive (but weaker) associations found in males in the previous study for emotional abuse, but inconsistent with the prior results in males for physical and sexual abuse (i.e., which showed negative relationships). In other cases, Bayesian analyses found poor evidence for or against the null model (or equal evidence for a null model and a model with an effect of early adversity) when individuals were separated by sex. There were no cases wherein strong evidence for the null model was found (i.e., there was not strong evidence against these findings in prior work). Overall, these results support a nuanced picture in which different types of early adversity may influence males and females in different ways, with most promoting reduced EA in females but some (i.e., emotional abuse) potentially facilitating greater EA in males.

As expected, greater early adversity was associated with greater emotional symptoms, greater implicit/explicit negative affect, and lower explicit positive affect. Emotional awareness was not associated with emotional symptoms overall, but it showed an unexpected positive association with emotional symptoms in males. However, this is consistent with prior work showing a positive relationship between EA and generalized anxiety disorder (Novick-Kline et al., 2005). There was a positive (but weak) association between explicit positive affect and EA for others that was consistent with expectations, but EA was not associated with other aspects of current affect (i.e., implicit affect or explicit negative affect). While the primary hypotheses about EA as a mediator between early adversity and emotional health were not supported, supplementary analyses offered some support for EA (for others) as a partial mediator of the relationship between higher early adversity and lower positive affect (i.e., suggesting early adversity may lead to less positive affect in part by lowering emotional awareness for others—while acknowledging limited interpretability of mediation results in cross-sectional data). Speculatively, this could relate to lower positive affect as a result of reduced emotional satisfaction in social interactions with others, but this would need to be tested in future work.

Only a few apparent differences exist between the two samples to account for inconsistent results in males. Both males and females in the current sample had lower levels of parental antipathy, and males in the current sample had greater sexual abuse than in the previous sample. Overall, the current sample had higher EA than the previous sample. This could perhaps relate to differences in relationships to EA seen for these variables and might suggest a more general difference between samples. However, it does not offer a straightforward explanation for the other differences found between studies. There are other possible confounding factors that were not assessed. For example, very high or low levels of state emotional arousal are expected to reduce measured levels of EA (Allen, 2013; Versluis et al., 2021); in this case, trait EA may act as a risk factor for the magnitude of this influence. It is possible that differences found between samples could be accounted for if state-related variance were considered.

Other limitations of the current study should be highlighted. First, our sample was restricted in multiple ways. Similar to the previous study (Smith et al., 2022), it consisted of undergraduate students with a narrow age range and fewer males than females. A sample with a wider range of ages, socioeconomic/educational backgrounds, racial/ethnic diversity, and more male participants could be more sensitive in discerning relationships between variables. Relatedly, despite a focus on health outcomes, participants were not recruited based on psychiatric or other medical diagnoses. A sample recruited based on emotional (or other psychiatric) disorder diagnoses might reveal stronger relationships. Additionally, the early adversity measures did not provide participants the opportunity to specify at what age they experienced maltreatment. Instead, all self-reported maltreatment was considered "under the age of 17". Given the young age of the sample, it is possible some adverse experiences occurred close to the time of participation, and these might not have influenced early development of emotion processing as hypothesized. Furthermore, although similar to those reported in community samples (Scher et al., 2001), our participants had relatively low CTQ scores. As such, our results should be replicated in individuals reporting greater early adversity. Moreover, college students may possess lower levels of early adversity overall, as is evidenced by the fact that early adversity can negatively impact academic achievement and pursuit of higher education (Hardner et al., 2018; Romano et al., 2015). College students who show greater resilience may also be less impacted by the early adversity they experience, given that resilience appears to mediate and moderate harmful effects for this group (Maples et al., 2014). Another potential limitation may be the emotional awareness measure used in the present study. Because the LEAS uses hypothetical scenarios, it is possible individual differences in EA scores partially reflect

vividness of imagination or verbal ability. Also, while general symptoms of anxiety and depression were accounted for, PTSD-specific symptoms were not assessed; these symptoms could show unique relationships to early adversity. Finally, although early adversity measures ask about childhood experiences, they are retrospective and potentially subject to memory or other report biases. A longitudinal study gathering objective data on early adversity in childhood would provide a stronger test of our hypotheses.

Potential implications

With these limitations in mind, it is worth considering the potential significance of the overall picture suggested when considering both samples—namely, a negative relationship between early adversity and EA in females and a more variable relationship between these factors in males. The consistent results in females support the possibility that early adversity may contribute to adverse health outcomes associated with low EA later in life. Future research will need to include measures of a larger number of physical and mental health outcomes to assess this. The greater variability found in males is consistent with previous work showing greater variability in emotion recognition and emotional awareness scores in males than females (Wright et al., 2018). This is also consistent with predictions of theories within evolutionary and developmental psychology—because males have more variable levels of parental investment than females and may have more variable affiliative socio-emotional interactions (Smith et al., 2020). Boys and girls in childhood are known to respond differently to early adversity—including different coping styles and greater internalizing behavior in females vs. externalizing in males (for a review, see Walker et al., 2004). Thus, there are multiple factors that could account for the sex differences found here, which will be important topics of future investigation.

Conclusion

In conclusion, this study found evidence for negative associations between specific aspects of early adversity and EA in females and positive associations in males. It also found limited evidence for EA as a mediator of the influence of early adversity on emotional health. While some associations between EA and early adversity were consistent with a previous study, several others (particularly in males) were not. These results suggest a more complex model in which different types of early adversity may influence males and females differently, and they highlight the need for further research to better understand the mediating and contextual factors that explain these potentially distinct relationships.

Disclosure statement

None of the authors have any conflicts of interest to disclose.

Data availability

Data from this study are available on request.

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