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Lower Emotional Awareness Is Associated With Greater Early Adversity and Faster Life History Strategy

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Recent theoretical work suggests that emotional awareness (EA) depends on the harshness/predictability of early social interactions—and that low EA may in fact be adaptive in harsh environments that lack predictable interpersonal interactions. In evolutionary psychology, this process of psychological "calibration" to early environments corresponds to life history strategy (LHS). In this paper, we tested the relationship between EA and LHS in 177 (40 male) individuals who completed the Levels of Emotional Awareness Scale (LEAS), Arizona Life History Battery (short form: K-SF-42), and 2 measures of early abuse/neglect. Significantly lower EA was observed in those with faster LHS and who had experienced greater early adversity. Notably, LEAS was associated with differences in (a) general reflective cognition, and (b) emotional support from parents during childhood. This suggests that variations in EA may arise during development based on the benefits of cognitive reflection in environments with different levels of harshness and social predictability.

Public Significance Statement
This study found evidence that individuals who grew up in more harsh and unpredictable environments (e.g., abuse/neglect) also had less awareness of their own emotions and the emotions of others. This relationship was (partially) explained by differences in an evolutionary construct called life history strategy (LHS), which suggests that harsh and unpredictable early environments discourage organisms from investing energy toward planning for the distant future or maintaining long-term relationships. This suggests that individual differences in emotional awareness may follow from the way early environments influence whether or not we spend energy on reflective thinking and forming close bonds with others.

Keywords: emotional awareness, life history strategy, development, early childhood adversity

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All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

Informed consent was obtained from all individual participants included in the study.

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Trait emotional awareness (EA) is a widely recognized individual difference variable relevant to mental health. Outwardly, high levels of EA reflect the tendency of individuals to report granular emotional experiences in themselves and to infer similar experiences in others. This outward tendency is thought to arise from trait differences in attention to affective (e.g., bodily) sensations and motivations, as well as the precision or specificity of the emotion concepts an individual has learned to use to understand those experiences. As measured by the Levels of Emotional Awareness Scale (LEAS; [Lane et al., 1990]), multiple studies suggest that EA is an important determinant of adaptive emotional functioning. High EA has been linked to multiple socially and emotionally adaptive skills and personality traits, such as emotion recognition ability and openness to experience (Barchard et al., 2010; Brébjard et al., 2012; Ciarrochi et al., 2003; Lane et al., 1990; Lane et al., 1996; Lane et al., 2000; Smith et al., 2019; Wright et al., 2017). Low EA has also been observed in multiple affective disorders (Berthoz et al., 2000; Bydlowski et al., 2005; Donges et al., 2005; Frewen et al., 2008; Levine et al., 1997). Understanding the origin of individual differences in EA may therefore be important for both improving mental health and more fully characterizing the nature of interactions between cognitive and socioaffective processes.

In a recent review drawing on research within evolutionary biology (Smith et al., 2020), a link was proposed between EA and the construct of life history strategy (LHS; Ellis et al., 2009; Figueredo et al., 2004, 2007; Sherman et al., 2013). LHS reflects a continuum between "faster" and "slower" strategies that characterizes differences in cognition and behavior both within and between species. A slower LHS indicates the tendency to act as though distant future outcomes are predictable and supports a greater allocation of metabolic resources to effortful cognition and the maintenance of social bonds. In humans, this leads to long-term goal-directed behaviors, such as maintaining long-term romantic relationships, strong parental investment, low risk-seeking, and greater engagement in reflective, future-oriented cognition and planning (Sherman et al., 2013). Slower LHS is thought to develop through a "calibration" of cognitive/behavioral tendencies to early childhood environments that are socially stable and predictable, where future-oriented cognition would be adaptive (Brumbach et al., 2009; Ellis et al., 2009). In contrast, "faster" LHS is thought to develop through calibration to harsh and unpredictable early environments (e.g., abuse, neglect, and high levels of crime and mortality) in which reflecting on the thoughts and emotions of others (and long-term future outcomes generally) may be less adaptive. Such individuals tend to be more risk-seeking and impulsive, as immediate gains are (at least implicitly) believed to be essential for survival. They are likely to engage in many shallow, short-term sexual relationships with low investment in parenting (Wolf & Figueredo, 2011). This suggests that it may be adaptive in socially unpredictable environments to avoid attending to (and learning about) emotions (i.e., to have low EA), because attention to (unpredictable) patterns in affective responses may carry less useful action-guiding information (for more detailed discussion of proposed relationships between LHS and socialization in childhood, see (Belsky et al., 1991; Figueredo et al., 2015); for critical considerations, see (Zietsch & Sidari, 2020)).

Both high EA and slower LHS are thought to depend on early social environments where stable patterns of interpersonal engagement persist over time. Females also tend to have slower LHS characteristics than males (e.g., greater parental investment), similar to the pattern of sex differences seen in EA (Barrett et al., 2000; Ciarrochi et al., 2005; Wright et al., 2017). In addition, previous work has also linked LHS to both bodily/interoceptive awareness (Proffitt Leyva & Hill, 2018) and emotional intelligence (van der Linden et al., 2015), each of which have been linked to EA or the related construct of alexithymia (Aaron et al., 2020; Brewer et al., 2016; Herbert et al., 2011; Onur et al., 2013; Pollatos et al., 2005; Simmons et al., 2013; Smith, Lane, et al., 2018; Terasawa et al., 2014; Trevisan et al., 2019; Zaki et al., 2012). For example, Proffitt Leyva and Hill (2018) have suggested that individuals may develop low interoceptive awareness because they selectively allocate energy resources toward monitoring the conditions in the external environment, and therefore fail to monitor and learn from internal bodily and emotional states. Based on these and other considerations, it has been proposed that LHS may contribute to EA in at least two ways (Smith et al., 2020). First, individuals may display lower EA as part of a more general tendency not to engage in reflective, future-oriented cognition (i.e., failing to reflect on emotions is one example of failing to internally reflect more generally before making decisions). Second, low EA may manifest as a direct consequence of not having the opportunity to learn about emotions in childhood, which arises from the

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early abuse, neglect, and inconsistent social interactions with parents associated with faster LHS calibration. However, the hypothesized relationships between EA, LHS, and associated levels of harshness and unpredictability in early childhood have yet to be tested empirically. If confirmed, this would provide insights about the developmental origins of EA and support the idea that EA corresponds to the application of general reflective cognitive capacities to emotion-related signals (e.g., facial cues in others, or felt patterns of bodily sensations and motivations in oneself within particular contexts). In this study, we collected data on EA, LHS, and early childhood environments in the same individuals to test the hypothesized relationship between these variables, with a particular focus on the relationship between early childhood abuse/neglect, reduced use of general reflective cognitive capacities, and the lower levels of EA expected to result from these factors. Due to the well-known differences in EA between males and females (Wright et al., 2017), and differences in the effects of early adversity on males versus females (Bath, 2020), we also explore whether patterns in these relationships differ by sex.

Method

Participants

A convenience sample of students at the University of Arizona (mean age = 19, *SD* = 2 years), 40 male and 137 female, was recruited from Tucson, AZ. Participants gave informed consent and received course credit for their participation.

Measures

The primary variables of interest were LEAS scores (Barchard et al., 2010; Lane et al., 1990) and scores on the K-SF-42, a psychometric measure of LHS (Figueredo et al., 2017; Mansonet al., 2020). We also collected two measures of early childhood adversity, the Childhood Trauma Questionnaire (CTQ; Bernstein et al., 2003) and the Childhood Experiences of Care and Abuse questionnaire (CECA; Bifulco et al., 2005).

The LEAS asks participants to describe the feelings they believe they and another individual would feel in each of 20 scenarios; scoring is based on the words used to describe feelings, irrespective of the appropriateness of the response. For each of the 20 stated scenarios: a score of 0 is given to nonemotional words (e.g., confused); a score of 1 is given to words related to bodily sensations (e.g., "tired"); a score of 2 is given to words that denote emotional actions (e.g., "punching") or simple valence distinctions (e.g., good/bad) that entail approach/avoidance; a score of 3 is given to single emotion concept terms (e.g., "happy," "sad"); and a score of 4 is given when at least 2 emotion concept terms are used for a single scenario. For each scenario, the self- and other-related responses are scored separately (i.e., with a value of 0–4). A "total" score is then given for each of the 20 LEAS scenarios, which reflects the higher of the self- and other-related scores, unless a score of 4 is given for both. In that case, a total score of 5 is given for the scenario, as long as the self- and other-related responses are differentiable (for more details see [Lane et al., 1990]). The interrater reliability (intraclass correlation) of the LEAS total score is .96, along with a Cronbach's alpha of .88 (Lane et al., 2000). These data were scored based on a previously validated computer scoring method (Barchard et al., 2010).

The K-SF-42 is a shortened version of the Arizona Life History Battery (Figueredo et al., 2017), which is a psychometric measure of LHS. It provides scores for the latent "K-factor" linked to LHS within the psychometric approach, as well as subscale scores that measure particular variables that load onto that factor. More specifically, it contains 42 statements, assessing seven domains thought to predict or mediate the way LHS is calibrated (6 items each), where participants select responses either from "strongly disagree" (-3) to "strongly agree" (+3) or from "not at all (0) to "a lot" (4), depending on the statement. These items reflect parental support during childhood as well as current behaviors associated with faster versus slower LHS. The seven domain scores indicate: general reflective cognition ("insight, planning, and control"), general supportiveness to others (friends, family, and community), level of religiosity, comfort with close emotional relationships, emotional support received from parents during childhood, and current emotional support received from family and friends. Domain scores are simply the mean of the associated item scores. Total scores reflect the mean of the normalized domain scores. A higher score is associated with a slower life history strategy.

The CTQ measures emotional, physical, and sexual abuse with three subscales, each consisting of five items scored on a five-point rating scale (1 =

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"never true" and 5 = "very often true"). We also took the mean of the subscale scores to generate a total CTQ score. The CECA measures lack of parental care with subscales corresponding to "neglect" and "antipathy." These two subscales consist of eight items each, and each item is scored separately for mother and father figures (32 items total). An example item is "she was very difficult to please," where participants are asked to rate this item on a five-point scale (1 = "no, not at all," 3 = "unsure" and 5 = "yes, definitely"). We also took the mean of the subscale scores to generate a total CECA score. The scales of the CTQ and CECA have good reliability and validity (Bernstein et al., 2003; Bifulco et al., 2005).

Analyses

EA and LHS

To assess our hypothesis about the relationship between EA and LHS, we first ran JZS Bayes factor analyses with default prior scales in R (i.e., the generalTestBF function within the BayesFactor package [Morey & Rouder, 2015; Rouder et al., 2012]) comparing evidence for null (intercept only) regression models to the space of regression models that included all combinations of main effects of age, sex, and K-SF-42 scores on LEAS total scores (i.e., where each model was estimated with predictors entered simultaneously). A Bayes factor (BF) represents the ratio of the probability of observed data under one model versus another (i.e., where a higher probability of data under a model provides more evidence for that model). That is, if H_0 indicates the null hypothesis, H_1 indicates the alternative hypothesis, and d indicates the data, then:

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

For example, BF = 1 indicates equal evidence for two models, while BF = 3 = .75/.25 – that is, the data are three times more probable under the alternative hypothesis than under the null hypothesis. 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, the priors placed on the intercept and variance are broad and uninformative, while the priors placed on standardized effects are weakly informative in that they place lower probability on extreme and unlikely standardized slopes (also see [Rouder & Morey, 2012]). We incorporate BFs in our analyses because they provide a straightforward basis for model selection and allow the evaluation of evidence for the null model as well as models that include any combination of potentially relevant predictor variables. When interpreting the strength of evidence of each finding below, we adopt the guidelines described in Lee and Wagenmakers (Lee & Wagenmakers, 2014): BF = 1–3, poor/anecdotal evidence; 3–10, moderate evidence; 10–30, strong evidence, 30–100, very strong evidence, >100, extremely strong evidence.

As the previously proposed theoretical framework motivating our hypothesis was based on particular aspects of LHS (namely, those associated with reflective cognition and early socioemotional interactions), we considered models with K-SF-42 total scores as well as models with all possible combinations of K-SF-42 subscale score as possible predictors. This is also consistent with recent work highlighting theoretical distinctions between the constructs measured by these subscales (e.g., early environment as a causal factor in LHS calibration vs. the resulting patterns in present cognition and behavior; e.g., see [Copping et al., 2017]). As such, comparison of BFs across models including any combination of K-SF-42 scores afforded investigation of whether EA would also show specific associations with the particular aspects of LHS most strongly implicated by previous work.

Because LHS is thought to reflect an early developmental calibration process (with limited evidence of malleability later in life; [Conradt et al., 2018]), whereas EA reflects concept learning and selective attention habits that can be learned throughout childhood and adulthood (Burger et al., 2016; Colvert et al., 2008; Montag et al., 2014; Neumann et al., 2017; Radice-Neumann et al., 2009; Smith, Killgore, et al., 2018; Smith et al., 2019; Thakur et al., 2017), it was most theoretically appropriate to have LHS as a predictor of EA. After confirming the presence of this hypothesized relationship, we then performed secondary correlational analyses examining relationships with LEAS scores when only looking at self- versus other-focused emotional descriptions. Given expected sex differences (Bath, 2020; Ellis et al., 2009; Wright et al., 2017), we further examined the correlation between LEAS scores and K-SF-42 scores separately in males and females. These

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secondary analyses were performed to best interpret the specific nature of the relationship between EA and LHS.

Early Adversity

To assess the hypothesized role of early childhood environments in calibrating LHS, and in turn influencing EA, we then conducted a second set of analyses to examine 1) the expected relationship between greater early childhood adversity and faster LHS, and 2) the degree to which early adversity accounted for shared variance between EA and LHS. To do so, we first conducted Bayes factor analyses analogous to those above to confirm that CTQ and CECA scores predicted the K-SF-42 scores within the winning models predicting LEAS total scores. We then conducted a series of additional analyses using the mediation package in R (using bootstrapping procedures; [Tingley et al., 2013]) to assess the degree of shared versus unique variance in the relationship between LEAS, K-SF-42, and CTQ/CECA scores. This was not intended as a strong test of causal influences (i.e., as our data are cross-sectional, despite reflecting self-reported childhood experiences); however, it afforded some additional insights about the degree to which early adversity and LHS have shared versus unique explanatory variance when accounting for differences in EA (i.e., noting that the K-SF-42 scales measure current cognitive/behavioral strategies in addition to childhood experiences).

Results

Emotional Awareness and Life History Strategy

The descriptive statistics for our key variables of interest are given in Table 1, which also indicates the presence of any sex differences. Age was not significantly correlated with LEAS, K-SF-42, CTQ, or CECA total scores. When analyzing subscales, older age was associated with greater CECA mother antipathy and neglect scores (r = .21 and .23, p = .005 and .002) and less support from parents and family on the K-SF-42 (r = −.17 and −.21, p = .02 and .005). T1

In a Bayes factor analysis assessing models with age, sex, and K-SF-42 scores as possible predictors of LEAS total scores, the most evidence was found for a model including sex and K-SF-42 subscale scores for reflective cognition and support from parents (Bayes factor [BF] = 605 relative to an intercept-only model; extremely strong evidence). The

Table 1
Summary Statistics (M and SD) for Study Measures by Sex

Measures	Total (N = 177)	Females (N = 137)	Males (N = 40)	P^a
Age	19.07 (1.82)	18.99 (1.71)	19.38 (2.12)	0.233
LEAS total	33.32 (3.99)	33.81 (4.06)	31.62 (3.28)	0.002
LEAS self	28.84 (4.59)	29.58 (4.41)	26.32 (4.34)	<0.001
LEAS other	27.03 (4.28)	27.50 (3.97)	25.42 (4.91)	0.007
K-SF-42 total	1.18 (0.54)	1.20 (0.50)	1.11 (0.63)	0.349
K-SF-42 reflective cognition	1.52 (1.01)	1.53 (1.01)	1.49 (1.01)	0.815
K-SF-42 general supportiveness	0.15 (1.14)	0.18 (1.11)	0.05 (1.27)	0.54
K-SF-42 religiosity	−0.23 (1.82)	0.21 (1.84)	−0.32 (1.77)	0.738
K-SF-42 comfort with emotionally close relationships	−0.13 (1.34)	0.13 (1.36)	−0.10 (1.27)	0.875
K-SF-42 emotional support from parents during childhood	2.45 (0.70)	2.45 (0.72)	2.43 (0.65)	0.895
K-SF-42 current emotional support from family	2.26 (0.77)	2.31 (0.73)	2.09 (0.85)	0.112
K-SF-42 current emotional support from friends	2.26 (0.78)	2.30 (0.75)	2.14 (0.85)	0.264
CTQ total	7.28 (2.91)	7.34 (2.94)	7.08 (2.84)	0.63
CTQ physical abuse	6.58 (2.98)	6.49 (2.97)	6.88 (3.06)	0.473
CTQ emotional abuse	9.15 (4.52)	9.38 (4.61)	8.38 (4.14)	0.217
CTQ sexual abuse	6.11 (3.08)	6.14 (3.14)	6.00 (2.91)	0.803
CECA total	16.27 (5.14)	16.04 (5.18)	17.08 (4.99)	0.262
CECA mother antipathy	18.25 (5.93)	18.01 (6.10)	19.05 (5.27)	0.332
CECA mother neglect	12.33 (5.88)	11.92 (5.63)	13.75 (6.52)	0.083
CECA father antipathy	18.45 (6.52)	18.36 (6.88)	18.75 (5.15)	0.743
CECA father neglect	16.05 (7.46)	15.85 (7.49)	16.75 (7.40)	0.502

Note. LEAS = Levels of Emotional Awareness Scale; CTQ = Childhood Trauma Questionnaire; CECA = Childhood Experiences of Care and Abuse Questionnaire.
[a] p-values are based on two-sample t-tests between males and females.

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2nd-best model also included the K-SF-42 subscale for comfort in emotionally close relationships as an additional predictor (BF = 393 relative to an intercept-only model). Posterior regression coefficients for the best model were: sex (female): $b = .99$, 95% credible interval [CI] [.35, 1.66]; reflective cognition: $b = .70$, 95% CI [.16, 1.24]; parental support: $b = 1.01$, 95% CI [.22 ,1.23]. Posthoc Pearson correlation analyses showed the expected positive relationship between LEAS total scores and the K-SF-42 subscale scores in the winning model (reflective cognition: $r = .21$, $p = .005$; support from parents: $r = .21$, $p = .005$), and a posthoc two-sample t test confirmed the expected sex effect with females having higher LEAS total scores than males ($t[77] = 3.50$, $p < .001$). K-SF-42 total scores were marginally associated with LEAS total scores ($r = .14$, $p = .06$).

To better understand the nature of the observed relationships between EA and LHS, we then performed posthoc correlation analyses between K-SF-42 scales and LEAS scores, while also analyzing EA for self and others separately. Figure 1 shows correlation matrices indicating these relationships, both including all participants and separated by sex. Figure 2 shows scatterplots of some of the notable relationships between the LEAS and K-SF-42 measures. As can be seen in these figures, LEAS scores showed significant (but fairly weak) positive relationships with reflective cognition and the presence of emotionally supportive parents during childhood. The pattern was broadly similar in males and females, although no relationships were statistically significant in males due to the smaller sample size. Several relationships also appeared somewhat stronger (numerically, but not significantly) in females.

Early Adversity and Life History Strategy

Before assessing joint relationships between early adversity, LHS, and EA, here we first confirm the expected relationships between early adversity, as measured by the CTQ and CECA scales, and the K-SF-42 scales that were associated with LEAS total scores above. We focus specifically on the K-SF-42 reflective cognition scale, as it is more central to the hypothesis that EA is facilitated by an LHS-related calibration of general reflective tendencies (note also that the K-SF-42 parental support items have much stronger direct content overlap with the CTQ and CECA items and would therefore be expected to correlate based on this alone).

In a Bayes factor analysis assessing age, sex, and CTQ scores (and interactions between sex and CTQ scores) as possible predictors of K-SF-42 cognitive reflection scores, the most evidence was found for a model including CTQ sexual abuse scores (BF = 3.6e + 4 relative to an intercept-only model; extremely strong evidence). The 2nd-best model also included age as an additional predictor (BF = 1.4e + 4 relative to an intercept-only model). Posterior regression coefficients for the best model were: CTQ sexual abuse: $b = -.12$, 95% CI [−.16, −.07]. A posthoc Pearson correlation analysis showed the expected negative relationship between CTQ sexual abuse scores and K-SF-42 cognitive reflectiveness scores (i.e., greater sexual abuse was associated with less cognitive reflectiveness; $r = -.37$, $p < .001$). To more fully understand the relationship between CTQ scores and K-SF-42 scores, and to facilitate hypothesis generation for future studies, we subsequently conducted posthoc correlations between the other K-SF-42 and CTQ scales (shown in Figure 3). This revealed the broader pattern of expected relationships between these measures.

In a Bayes factor analysis assessing age, sex, and CECA scores (and interactions between sex and CECA scores) as possible predictors of K-SF-42 cognitive reflection scores, the most evidence was found for a model including age, and CECA scales for father antipathy and neglect from both mother and father (BF = 224 relative to an intercept-only model; extremely strong evidence). The 2nd-best model removed age from the winning model (BF = 131 relative to an intercept-only model). Posterior regression coefficients for the best model were age: $b = .08$, 95% CI [.0, .15]; father antipathy: $b = -.04$, 95% CI [−.07, −.01]; mother neglect: $b = -.05$, 95% CI [−.08, −.03]; father neglect: $b = .04$, 95% CI [.01, .07]. Posthoc Pearson correlation analysis showed the expected negative relationship between K-SF-42 cognitive reflectiveness scores and both father antipathy and mother neglect scores (i.e., higher scores were associated with less cognitive reflectiveness; $r = -.18$ and $-.25$, $p = .02$ and $p < .001$, respectively). The zero-order correlation with father neglect was nonsignificant ($r = -.05$), indicating that the positive relationship between father neglect and cognitive reflectiveness found above was only present after accounting for father antipathy and mother neglect. As with the CTQ, to more fully understand the relationship between CECA scores and K-SF-42 scores, and to facilitate hypothesis generation for future studies, we subsequently

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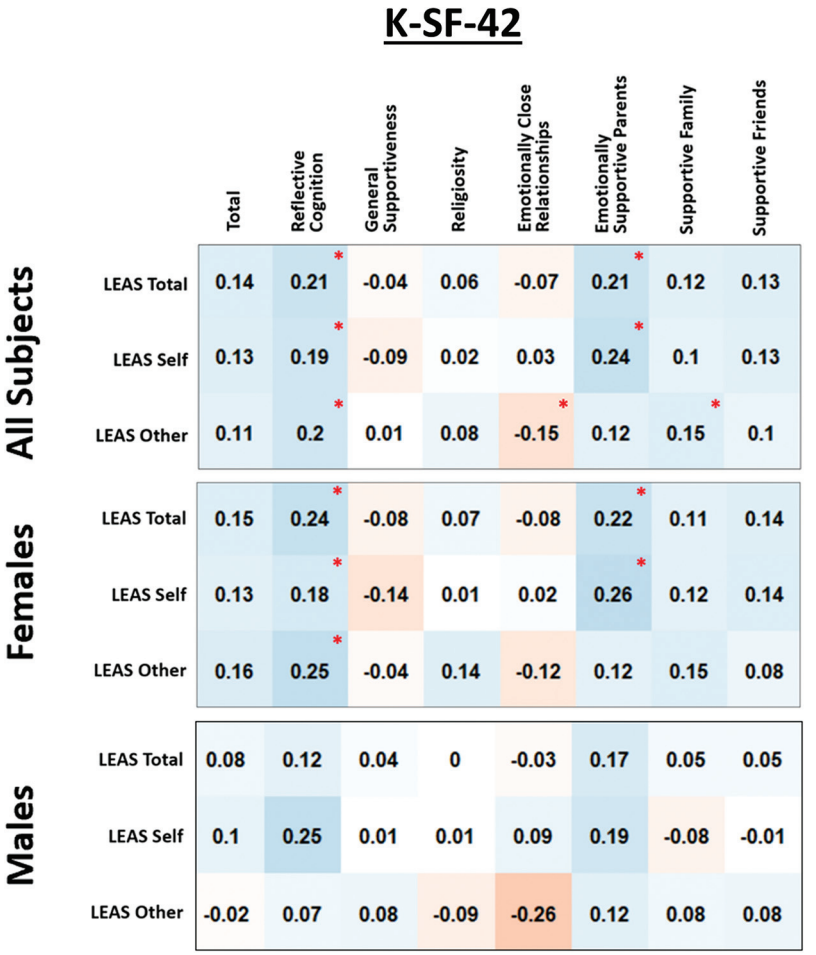
Figure 1

Pearson Correlations Between LEAS (Total, Self, And Other) Scores and the Total and Seven Subscales of the K-SF-42



Note. LEAS = Levels of Emotional Awareness Scale. The top panel shows correlations across the whole sample, while the middle and lower panels show relationships in females and males separately. For reference, red asterisks indicate $p < .05$ (uncorrected). Note that these were posthoc analyses to guide interpretation of the initial hypothesized finding that LEAS total scores and K-SF-42 scores would be positively related. Also note that, despite having similar magnitude, no correlations were significant in males due to the smaller sample size ($N = 40$, compared to $N = 137$ for females). See the online article for the color version of this figure.

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conducted posthoc correlations between the other K-SF-42 and CECA scales (shown in Figure 3). This further confirmed the broader pattern of expected relationships. Analogous correlation matrices separated by sex for CTQ and CECA scores are shown in online supplemental materials. These suggested broadly similar patterns in males and females; however, males showed significant correlations between early adversity and religiosity not present in females and also showed a general pattern of weaker correlations between K-SF-42 scores and CTQ scores.

For the curious reader, correlation matrices indicating the relationships between subscales of each measure are also provided in online supplemental materials.

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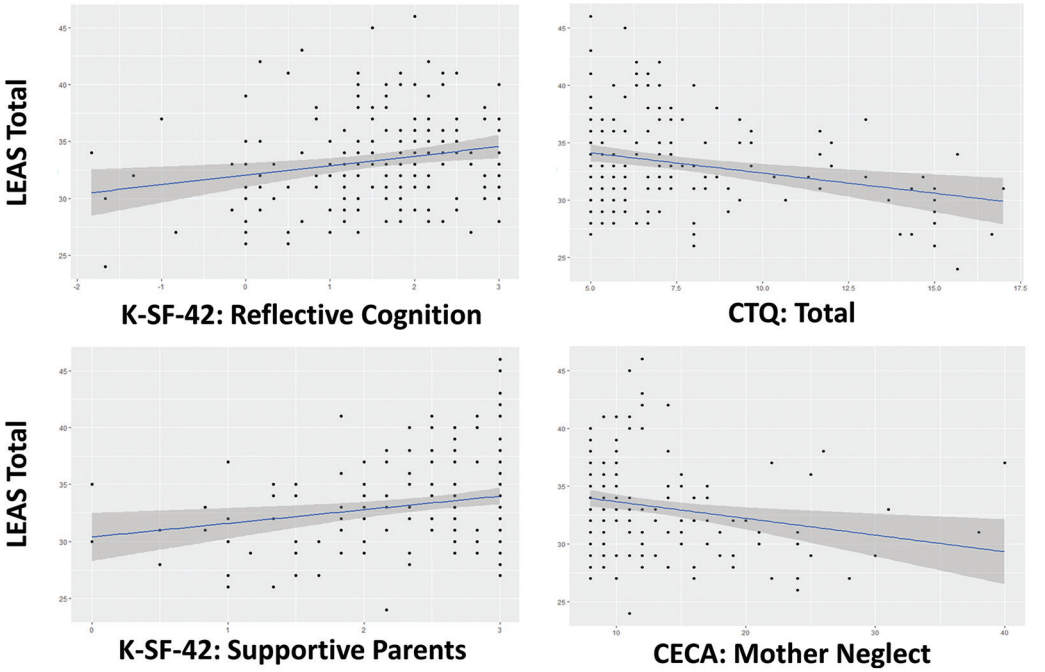
Figure 2

(Left) Scatterplots Illustrating the Relationship Between LEAS Total Scores and K-SF-42 Scores Corresponding to (a) the Tendency to Engage in Reflective Cognition ("Insight, Planning, and Control"), and (b) How Emotionally Supportive One's Parents Were During Childhood. (Right) Scatterplots Illustrating the Relationship Between LEAS Total Scores and Early Adversity Scores Reflecting Overall Childhood Trauma (CTQ) and Experiences of Neglect From One's Mother During Childhood (CECA)



Note. LEAS = Levels of Emotional Awareness Scale; CTQ = Childhood Trauma Questionnaire; CECA = Childhood Experiences of Care and Abuse Questionnaire. See the online article for the color version of this figure.

Early Adversity, Life History Strategy, and Emotional Awareness

Having confirmed that early adversity is related to the LHS domains associated with EA, we now assess whether early adversity also predicts EA. We then perform mediation analyses to examine the plausibility of a model in which early adversity "calibrates" LHS, which in turn influences the development of EA. That is, we assess the degree to which our measures of early adversity and LHS have shared or unique explanatory variance with respect to differences in EA.

In a Bayes factor analysis assessing age, sex, and CTQ scores (and interactions between sex and CTQ scores) as possible predictors of LEAS total scores, the most evidence was found for a model including sex and CTQ physical abuse scores (BF = 3.5e + 4 relative to an intercept-only model; extremely strong evidence). The 2nd-best model further included CTQ sexual abuse scores (BF = 1.5e + 4 relative to an intercept-only model). Posterior regression coefficients for the best model were: sex (female): $b = .94$, 95% CI [.29, 1.58]; physical abuse: $b = -.41$, 95% CI [−.59, −.23]. Both physical and sexual abuse subscales and CTQ total scores showed significant negative correlations with LEAS total scores (for subsequent posthoc correlational results, see Figure 4; also see scatterplots in Figure 2). F4

In a Bayes factor analysis assessing age, sex, and CECA scores as possible predictors of LEAS total scores, the most evidence was found for a model including sex and CECA mother neglect scores (BF = 50 relative to an intercept-only model; very strong evidence). The 2nd-best model further included age (BF = 39 relative to an intercept-only model). Posterior regression coefficients for the

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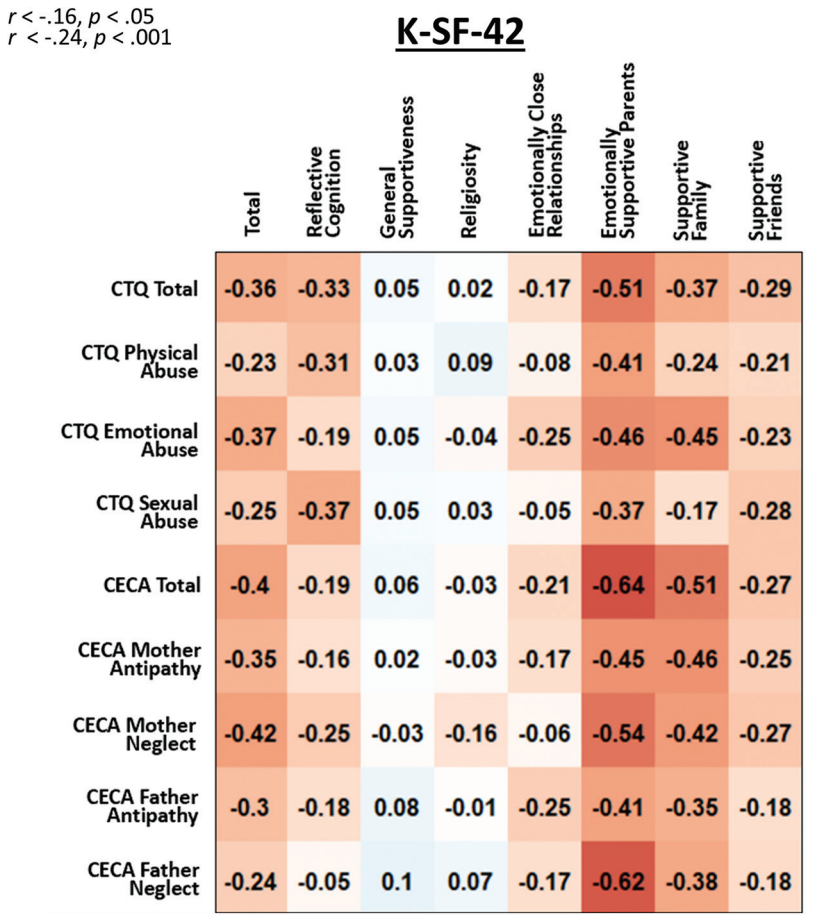
Figure 3

Pearson Correlations Between Early Adversity (CTQ And CECA) Scores and the Total and Seven Subscales of the K-SF-42



Note. CTQ = Childhood Trauma Questionnaire; CECA = Childhood Experiences of Care and Abuse Questionnaire. For reference, correlation thresholds for uncorrected *p*-value thresholds are shown in the upper left corner. See the online article for the color version of this figure.

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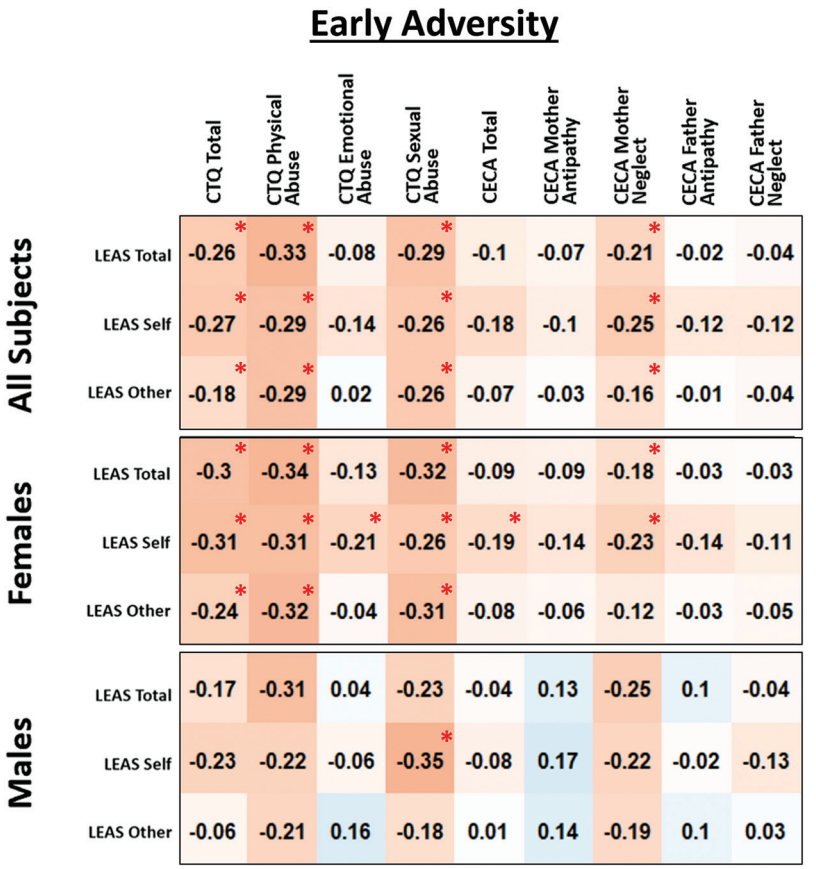
best model were: sex (female): $b = .91$, 95% CI [.25, 1.60]; mother neglect: $b = -.12$, 95% CI [−.21, −.02]. Only the mother neglect scale showed a significant negative correlation with LEAS total scores (for posthoc correlations, see Figure 4; also see scatterplots in Figure 2).

Because multiple CTQ subscales and CTQ total scales were significantly related to LEAS total scores, we here chose to examine whether the effect of CTQ total scores on LEAS total scores was fully or partially mediated by K-SF-42 reflective cognition scores. As shown in Figure 5, the regression coefficients between CTQ total scores and LEAS total scores ($b = -.35$, $p < .001$), between CTQ total scores and K-SF-42 reflective cognition scores ($b = -.12$, $p < .001$), and between K-SF-42 reflective cognition scores and LEAS total scores ($b = .83$, $p = .005$) were significant. The indirect effect was (−.12)*(.83) = −.1. We tested the significance of this indirect effect using bootstrapping procedures. Unstandardized indirect effects were computed for each of 1,000 bootstrapped samples, and the 95% confidence interval was computed by determining the indirect effects at the 2.5th and 97.5th percentiles. The bootstrapped unstandardized indirect effect was −.065, and the 95%

Figure 4

Pearson Correlations Between LEAS (Total, Self, and Other) Scores and Early Adversity (CTQ and CECA) Scores



Note. LEAS = Levels of Emotional Awareness Scale; CTQ = Childhood Trauma Questionnaire; CECA = Childhood Experiences of Care and Abuse Questionnaire. The top panel shows correlations across the whole sample, while the middle and lower panels show relationships in females and males separately. For reference, red asterisks indicate $p < .05$ (uncorrected). Note that these were posthoc analyses to guide interpretation of the initial hypothesized finding that LEAS total scores and early adversity scores would be negatively related. Also note that, despite having similar magnitude, most correlations were not significant in males due to the smaller sample size. See the online article for the color version of this figure.

confidence interval ranged from −.15 to .00 (p = .05). As the direct effect of CTQ total scores on LEAS total scores remained significant (b = −.29, $p < .001$), this indicated a marginal partial mediation.

Because only CECA mother neglect scores were significantly related to LEAS total scores, we here chose to examine whether the effect of CECA mother neglect scores on LEAS total scores was fully or partially mediated by K-SF-42 reflective cognition scores. The regression coefficients between CECA mother neglect scores and LEAS total scores (b = −.14, p = .005), and between CECA mother neglect scores and K-SF-42 reflective cognition scores (b = −.04, $p < .001$) were significant. The indirect effect was (−.04)*(.83) = −.03. The bootstrapped unstandardized indirect effect was −.03, and the 95% confidence interval ranged from −.06 to .00 (p = .03). As the direct effect of CECA mother neglect scores on LEAS total scores remained significant (b = −.12, p = .01), this indicated a partial mediation.

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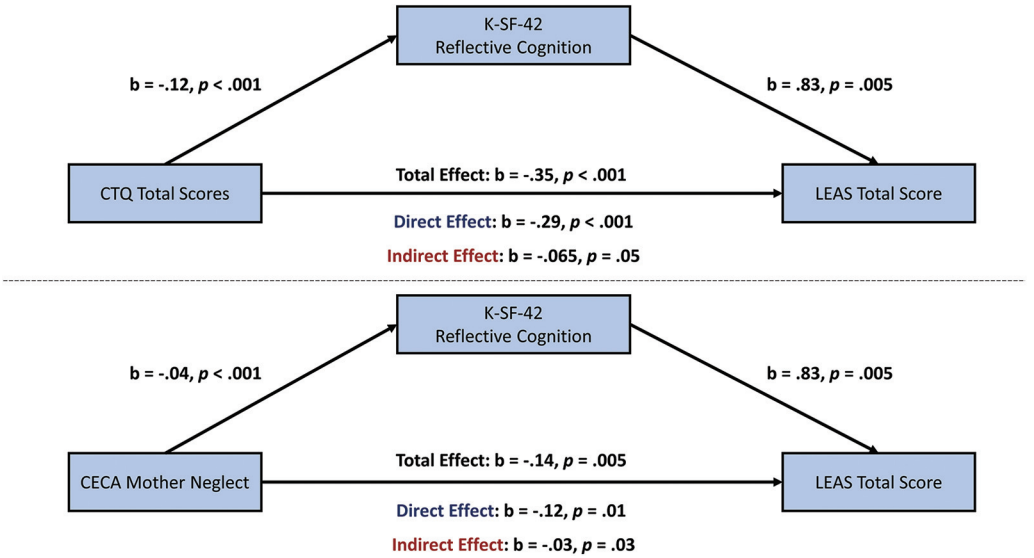
Figure 5

Illustration of Mediation Analyses Illustrating That Early Adversity and Current Tendencies Toward Reflective Cognition Share Explanatory Variance in Accounting for Individual Differences in Emotional Awareness (LEAS Total Scores)



Note. LEAS = Levels of Emotional Awareness Scale. See the online article for the color version of this figure.

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Discussion

Based on a recent theoretical model (Smith et al., 2020), in this paper we tested the prediction that lower EA was associated with faster LHS, and particularly with reduced application of general reflective cognitive processes and more harsh and unpredictable parenting. In support of this prediction, Bayesian analyses supported models that included both sex, LHS, and early adversity as predictors of EA. Further inspection of these hypothesized relationships based on sex, EA for self versus others, and different components of LHS revealed a number of specific insights. First the positive relationship between EA and LHS was driven primarily by 1) the general tendency to engage in (i.e., allocate metabolic resources to) effortful/reflective cognition (insight, planning, control), and 2) the presence of emotionally supportive parents during development.

The relationship with general reflective cognition supports our previous proposal (Smith et al., 2020) that EA depends on the application of domain-general cognitive capacities (e.g., attention, working memory, concept learning) to specific types of emotion-related (e.g., interoceptive) information. The relationship with emotionally supportive parents is also consistent with previous theoretical work (Smith, Killgore, et al., 2018) emphasizing the way that early interactions with parents is a primary means by which children learn to understand their own emotions and those of others. This interpretation was further bolstered by mediation analyses that revealed significant relationships between childhood abuse/neglect, LHS, and EA, and suggested that LHS (and particularly reflective cognition) may partially mediate the relationship between early adversity and EA. While our early adversity measures ask retrospectively about childhood experiences, it is important to highlight that the cross-sectional nature of our data still precludes drawing strong causal conclusions from these results. However, they are consistent with a model in which early adversity "calibrates" LHS, which in turn influences the development of EA.

Put together, these findings therefore support the idea that acquiring high EA—which involves emotion concept learning that can occur (or fail to occur) both early and later in life (Burger et al., 2016; Colvert et al., 2008; Montag et al., 2014; Neumann et al., 2017; Radice-Neumann et al., 2009; Smith et al., 2019; Thakur et al., 2017) – depends on both (1) developing general tendencies to engage goal-directed cognitive capacities based on the general

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predictability of early childhood environments, and (2) the availability of emotional signals to learn from via interactions with emotionally supportive caretakers. However, while significant, the observed relationships between LEAS and K-SF-42 scores were weaker than expected. Here it may be important to consider that this was a college student sample, where individuals with the fastest life history strategies are less likely to be present (i.e., choosing to go to college is itself a "slower" LHS behavior). College samples are also less likely to adequately represent populations of individuals who grew up in the dangerous, low socioeconomic status environments associated with the fastest end of the LHS spectrum. It is therefore possible that stronger relationships between EA, LHS, and early adversity would be observed in a community sample of individuals with a broader range of socioeconomic backgrounds and who showed K-SF-42 scores and early adversity scores in the faster and more severe ranges (respectively) that were underrepresented in our sample.

Another set of related considerations pertains to limitations of psychometric measures of LHS based on the K-factor (for a general critique of this approach, see [Zietsch & Sidari, 2020]). One potential issue is that, despite the work mentioned above on early-life calibration of LHS, one study found that heritability of psychometric K-factor scores was high and that shared environment did not account for significant variance (Figueredo et al., 2004). This is consistent with the fact that our results primarily reflected relationships with specific lower-order factors and not others (e.g., reflective cognition; for which early environment could have a larger impact), as well as with other work finding small effect size relationships between early life stress and self-reported LHS-related behaviors (Wu et al., 2020). However, these results also suggest that the K-SF-42 may have been less sensitive to LHS calibration than other commonly used psychosocial, biometric, and biodemographic measures (e.g., neighborhood stress and socioeconomic status, pubertal timing, timing of first sexual behavior and reproduction, short- vs. long-term sexual relationships, delay discounting, among others; see [Chua et al., 2020; Međedović, 2019, 2020]). It is also noteworthy that the K-SF-42 subscales were not all highly correlated in our sample (see Figure S3) – consistent with other work suggesting that that relationships between the subfactors contributing to total K-factor scores are not best captured by a unidimensional continuum (Manson et al., 2020; Richardson et al., 2021). For example, parental relationships scales are less related to other subfactors than would be expected, and—because some subfactors are posited to be the causes of others (e.g., early parental support influencing current sexual strategies) – it is theoretically suspect to assume a latent factor is a cause of their covariation (i.e., the subfactors are better understood as predictors or mediators of the development of LHS; [Copping et al., 2017; Gruijters & Fleuren, 2018]). These considerations suggest that an important direction for future work will be to examine the relationship between emotional awareness and psychosocial and biometric measures of LHS. Notably, recent work has also found weaker than expected relationships between psychometric and psychosocial/biometric LHS measures (Međedović, 2020), suggesting emotional awareness could show distinct (and potentially stronger) relationships with the latter measures.

In summary, this was the first study to test a theoretically motivated prediction regarding the relationship between emotional awareness and life history strategy—that is, the more general cognitive calibration to levels of social predictability and safety in early childhood environments. Our findings support this relationship and offer insights into the origins of EA and its relationship to other cognitive and developmental processes. This was also the first study to demonstrate the expected relationship between emotional awareness and parental abuse/neglect, and to confirm their joint relationship with life history strategy. The evolutionary psychological basis of the confirmed predictions also emphasizes the possibility that low EA may in fact be adaptive in some early childhood environments with less stable/predictable socioaffective response patterns. Future longitudinal research, which uses multiple psychometric, psychosocial, and biometric methods for assessing LHS, will be necessary to further delineate the relationship between emotional awareness, life history strategy, and associated experiences of early adversity observed in this study.

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