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Dimensions of early life adversity and cognitive processing of emotion in youth

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A R T I C L E I N F O

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A B S T R A C T

Background: Early life adversity (ELA) is a leading risk factor for psychopathology. The Dimensional Model of Adversity and Psychopathology (DMAP) elucidates processes altered by ELA and central to this association. Specifically, DMAP posits early experiences of deprivation alter cognitive and emotional processes in ways distinct from early experiences of threat. While evidence suggests that deprivation and threat predict alterations in cognitive and emotional processes, respectively, the influence of these dimensions on cognitive processing across emotionally valenced material remains unexamined.
Objective: This work is the first to investigate associations of deprivation versus threat on cognitive processing of multiple emotions (happy, sad, angry, and neutral facial expressions) and the time course of processing in a sample of youth.
Participants and setting: Eighty-two youth (48.80 % female, $M_{age} = 12.85$) were recruited from Vancouver.
Methods: Deprivation and threat were measured using the Traumatic Events Screening Inventory for Children (TESI-C), an interview-based measure assessing the instance and severity of 30+ experiences of ELA. Cognitive processing was measured using the Affective Posner Task, which assesses attentional biases and raw reaction times for happy, sad, angry, and neutral facial expressions.
Results: Interestingly, experiences of deprivation were associated with early attentional processing deficits regardless of valence, $rs \geq 0.22$, $ps \leq 0.046$, whereas experiences of threat were associated with late attentional biases for emotional material, $Bs \geq |4.15|$, $ps \leq 0.036$.
Conclusions: Findings advance theoretical models of ELA by elucidating the nature and time course of cognitive and emotional alterations following deprivation and threat, and, if replicated, suggest the importance of cognitive processing of emotion in early interventions.

1. Introduction

Exposure to early life adversity (ELA) is associated with adverse mental health outcomes across the lifespan (Green et al., 2010; McLaughlin et al., 2016). ELA also alters key processing systems, particularly those pertaining to cognition and emotion (Sheridan & McLaughlin, 2020). Importantly, alterations in these systems are evidenced as early as childhood (Arditte & Joormann, 2014) and are a

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means through which experiences of early adversity become embedded, thereby impacting wellbeing trajectories through adolescence and beyond (McLaughlin, Sheridan, & Lambert, 2014). As such, understanding the cognitive and emotional processes altered by ELA in early adolescence can identify targets for intervention, thus improving mental health outcomes for adversity-exposed youth.

One framework that elucidates the consequences of early adversity is the Dimensional Model of Adversity and Psychopathology (DMAP; McLaughlin et al., 2014; Sheridan & McLaughlin, 2014). This model posits that instances of ELA are generally characterized as experiences of either deprivation or threat. Experiences of deprivation include events that represent a lack of normative social, emotional, and/or cognitive input, such as neglect, caregiver absence, or financial hardship. In contrast, experiences of threat include events that represent a risk to physical integrity, such as abuse, domestic violence, or community instability. DMAP proposes that each dimension of ELA precipitates unique alterations in cognitive and emotional processing systems (Sheridan & McLaughlin, 2020).

Within the DMAP literature, evidence suggests that experiences of deprivation tend to influence cognitive processes, whereas experiences of threat tend to influence emotional processes. Indeed, a growing body of literature documents that experiences of deprivation are reliably associated with deficits in cognitive function (Johnson et al., 2021; Machlin, Miller, Snyder, McLaughlin, & Sheridan, 2019; Sheridan & McLaughlin, 2020). However, prior research has largely utilized cognitive tasks that employ neutral stimuli, and cognitive processing across emotionally valenced material (stimuli signifying a positive or negative emotion) has yet to be explored. This represents a significant gap in the DMAP literature, as biased processing of emotionally valenced material in adolescence increases risk for many forms of psychopathology (Arditte & Joormann, 2014), particularly for adversity-exposed youth (e.g., Platt, Sfärlea, Löchner, Salemink, & Schulte-Körne, 2023). Conversely, researchers have found that experiences of threat uniquely impact emotional processes (Lambert, King, Monahan, & McLaughlin, 2017; Machlin et al., 2019), and there is evidence to suggest that experiences of threat are associated with biased processing of fear-inducing stimuli, such as angry expressions (Schäfer et al., 2023). However, processing biases have yet to be sufficiently investigated for stimuli of other valences, such as happy and sad expressions.

Moreover, across the deprivation and threat literature, variance in stimulus duration between cognitive tasks has prevented conclusions from being drawn regarding the time course of cognitive processing. However, by systematically manipulating stimulus presentation times, we can gain insights into early versus late biases in cognitive processing in adversity-exposed youth. The importance of doing so is evidenced by findings that early versus late biases in cognitive processing differentially contribute to the onset and maintenance of psychopathology, with early processing biases being more characteristic of anxiety and late processing biases being more characteristic of depression (Kellough, Beevers, Ellis, & Wells, 2008; Koster, Verschuere, Crombez, & Van Damme, 2005). Thus, the lack of a systematic examination of time course in the DMAP literature is a notable gap with important implications for youth mental health. Taken together, while research suggests that experiences of deprivation and threat predict alterations in cognitive and emotional processes, respectively, the influence of these dimensions on the time course of cognitive processing across emotionally valenced material remains to be understood. As attention is a cognitive process that lends itself well to testing our questions, and has previously been used in the DMAP literature (Schäfer et al., 2023), it was selected as our metric of cognitive processing.

2. Research questions and hypotheses

This preregistered work (https://aspredicted.org/K3C_KZ8) extends the current literature by addressing two critical research questions: across emotional material, are deprivation and threat each associated with (1) raw reaction times and (2) attentional *engagement* and *disengagement* biases? To address Question 1 and extend our understanding of the cognitive processing of both emotional and non-emotional material, we examined the association of deprivation and threat with raw reaction times for each valence category (i.e., happy, sad, angry, and neutral). Given that associations between ELA and raw reaction times have yet to be examined across emotions, we did not have any a priori hypotheses for Question 1. To address Question 2, we examined whether experiences of deprivation and threat were each associated with attentional *engagement* and *disengagement* biases for emotional facial expressions. We looked at these two components of attention separately, as they are distinct processes that differentially predict the onset and maintenance of psychopathology (Koster, Crombez, Verschuere, & De Houwer, 2004; Rudaizky, Basanovic, & MacLeod, 2014). However, given limited investigations of engagement and disengagement biases in the DMAP literature to date (Blekić, Rossignol, Wauthia, & Felmingham, 2021; Schäfer et al., 2023), we expected similar associations of deprivation and threat with each attention bias. Specifically, we expected that experiences of deprivation would not be associated with attentional engagement (Hypothesis 1a) or disengagement (Hypothesis 2a) biases for happy, sad, or angry expressions. However, for angry expressions, we expected that experiences of threat would be positively associated with engagement (Hypothesis 1b; i.e., greater threat associated with quicker engagement with angry versus neutral expressions) and disengagement (Hypothesis 2b; i.e., greater threat associated with slower disengagement from angry versus neutral expressions) biases, but not with engagement (Hypothesis 1b) or disengagement (Hypothesis 2b) biases for happy or sad expressions. Moreover, given that the time course of attention has yet to be systematically examined in this population, we explored whether associations differ between short and long stimulus exposure durations (i.e., 200 ms and 1000 ms).

3. Methods

3.1. Participants

Youth were recruited as part of the University of British Columbia (UBC) *Study of Adolescents* from diverse communities across the Vancouver metropolitan area through the use of flyers, online advertisements, local media, and partnerships with community organizations (e.g., school boards). The parents/guardians of youth completed a preliminary screening interview over the phone to assess participant eligibility, which was then confirmed during the first in-laboratory session. Eligibility criteria included being 11 to 13 years of age and being fluent in English. Ineligibility criteria included marked cognitive impairment caused by a learning disability or history of severe head trauma/loss of consciousness. The final sample consisted of 82 youth between the ages of 11 and 13 years (M_{age} = 12.85; SD = 0.39), 51.20 % of whom were assigned male at birth. Participant characteristics are presented in Table 1.

3.2. Measures

3.2.1. Dimensions of early life adversity

Consistent with recent work (Chahal, Kirshenbaum, Ho, Mastrovito, & Gotlib, 2021; Chahal, Miller, Yuan, Buthmann, & Gotlib, 2022; Ho, Buthmann, Chahal, Miller, & Gotlib, 2024; Jopling, Rnic, Jameson, Tracy, & LeMoult, 2023; King et al., 2017; King, Graber, Colich, & Gotlib, 2020), we administered a modified version of the Traumatic Events Screening Inventory for Children (TESI-C; Ribbe, 1996) to identify youths' lifetime exposure to >30 types of ELA. This structured interview-based assessment addresses the limitations of self-report ELA measures by allowing the interviewer to collect extensive contextual details to accurately characterize each event. To quantify the objective severity of each event, these descriptions and contextual details were then presented void of information about youth's subjective perception of the event's severity to a panel of three independent raters. Objective severity scores were decided by the panel for each event using a modified version of the UCLA Life Stress Interview coding system (UCLA-LSI; King et al., 2017, 2020; Rudolph & Hammen, 1999), with ratings ranging from 0 (non-event or no impact) to 4 (extremely severe impact) in half-point increments (ICC = 0.97).

Events were categorized as deprivation or threat based on DMAP models and empirical evidence (e.g., Ho et al., 2024; McLaughlin et al., 2014; Sheridan & McLaughlin, 2014; see Table 1 and Tables S1-S2 in the Online Supplement). Consistent with recent work using the TESI-C to assess dimensions of ELA (Chahal et al., 2021, 2022; King et al., 2020), composite scores for deprivation and threat were

Table 1
Participant characteristics.

Variable	Participants (n = 82)
Age, *M (SD)*	12.85 (0.39)
Sex, *n*	
Male	42
Female	40
Gender, *n*	
Boy	42
Girl	39
Non-Binary	1
Identity, *n*	
European	49
Chinese	11
Multiple Racial Identities	7
South Asian	4
Latinx/e	3
West Asian	3
Canadian Indigenous	2
Korean	2
Japanese	1
Household Income, *n*	
$20,000–$59,999	8
$60,000–$99,999	14
$100,000–$119,999	12
$120,000–$159,999	16
$160,000 and over	24
Prefer Not to Answer or Missing	8
Deprivation Experiences[a], *n*	
Separation from Parents	43
Parental Mental Illness	13
Parental Legal Trouble/Arrest	8
Parental Financial Troubles	2
Neglect (Emotional or Physical)	1
Threat Experiences[a], *n*	
Witness Traumatic Accident/Injury	66
Experience Traumatic Accident/Injury	45
Community Instability/Violence	24
Intimidation/Bullying	23
Witness Domestic Violence	19
Emotional Abuse	3
Sexual Abuse	1
Age of ELA Onset, *M* (*SD*); Range	8.20 years (3.46); 0.5–13 years

[a] No ELA events were excluded due to lack of endorsement.

created by summing the maximum objective severity score for each event endorsed within each dimension. Composite scores ranged from 0 to 8.5 for deprivation ($M = 1.17$, $SD = 1.63$) and 0 to 21 for threat ($M = 2.92$, $SD = 3.08$). Participants who did not complete the TESI-C ($n = 10$) were excluded from analyses, leaving the final sample of 82 youth.

3.2.2. *Cognitive processing of emotion*

Cognitive processing of emotion was assessed using an affective Posner paradigm (Koster, De Raedt, Goeleven, Franck, & Crombez, 2005; see Fig. 1). For each trial, participants viewed two side-by-side frames and a fixation cross between them for 500 ms. Then, an emotional stimulus was presented in either the left or right frame. The emotional stimulus was one of 32 faces (16 male, 16 female) expressing happy, sad, angry, and neutral affect from the NimStim Face Stimulus Set (Tottenham et al., 2009). The facial expression was displayed for 200 ms in half of the trials, representing early attentional processes, and for 1000 ms in the other half of the trials, representing late attentional processes. After the presentation of the facial expression, "E" or "F" was shown either in the frame that the facial expression had been presented in (valid cue trial) or in the opposite frame (invalid cue trial). Participants indicated whether an "E" or an "F" had appeared by pressing the corresponding computer key as quickly and accurately as possible. Finally, a black screen was presented for 700 ms before the subsequent trial began. Within each block, cue duration was held constant, and cue valences and trial types were randomized. Error trials and outlier reaction times (RTs; i.e., RTs < 150 ms or > 1000 ms) were excluded from analyses (13.27 % valid trials, 14.21 % invalid trials; 13.74 % total trials), consistent with prior research (Jopling, Tracy, & LeMoult, 2021; Kircanski, Joormann, & Gotlib, 2015; Rnic, Battaglini, Jopling, Tracy, & LeMoult, 2023).

Consistent with Koster, De Raedt, et al. (2005), we calculated attentional engagement and disengagement bias scores for each valence (i.e., happy, sad, and angry) for both trial times (i.e., 200 ms and 1000 ms). Attentional engagement bias scores were calculated for each valence as the difference between RTs to valid neutral cues and RTs to valid valenced cues (i.e., RTs to valid neutral cues minus the RTs to valid valenced cues). Positive engagement bias scores indicate that the participant was quicker to direct their attention toward emotional versus neutral material, while negative engagement bias scores indicate the inverse. Similarly, attentional disengagement bias scores were calculated for each valence as the difference between RTs to invalid valenced cues and RTs to invalid neutral cues (i.e., RTs to invalid valenced cues minus the RTs to invalid neutral cues). Positive disengagement bias scores indicate that the participant was slower to shift their attention away from emotional material than from neutral material, while negative

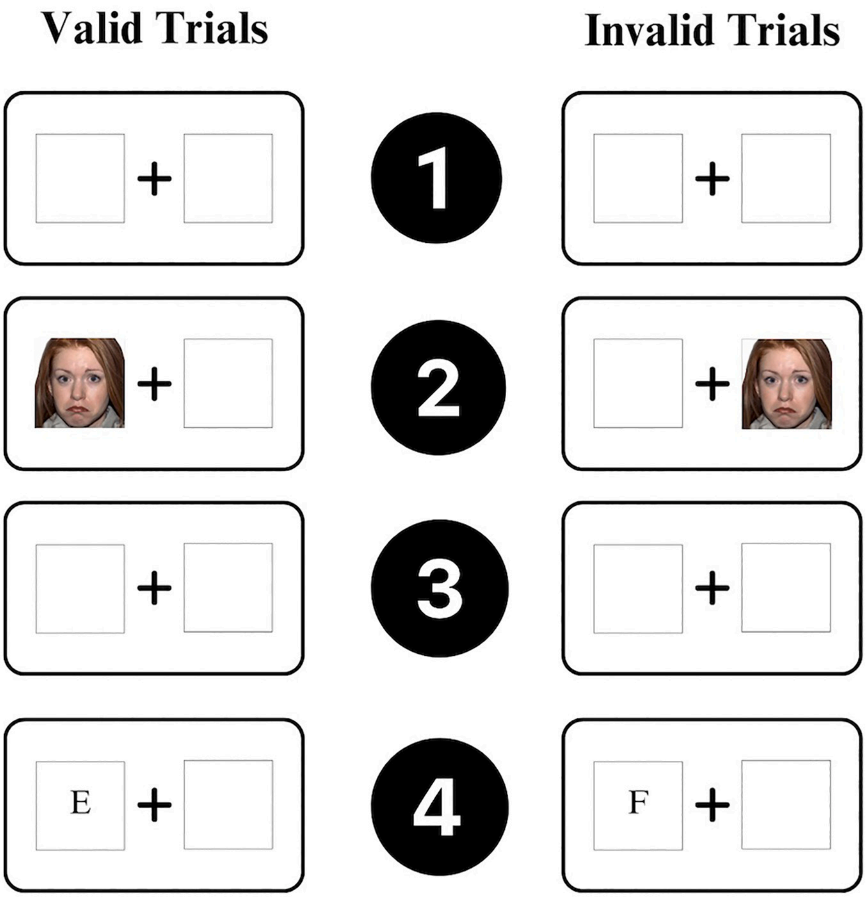

Fig. 1. Affective Posner Task Paradigm.

disengagement bias scores indicate the inverse.

3.3. Procedure

This study was approved by the UBC Behavioural Research Ethics Board (2017; H17–01901), which adheres to the ethical standards of the Declaration of Helsinki. Data were collected across two sessions. During an initial laboratory session, the parent/guardian and youth provided informed consent and assent, respectively. The parent/guardian then completed a brief demographic questionnaire while the youth completed the TESI-C. Youth then returned to the laboratory within a few weeks ($M = 18.81$ days, $SD = 11.47$ days) to complete the Affective Posner Task. The Affective Posner Task was completed on an ASUS 20-in. color computer monitor with a refresh rate of 60 Hz. Because cognitive biases can remain latent until activated by a negative mood state (Teasdale, 1988), participants watched one of three randomly assigned six-minute negative movie clips as a negative mood induction. To confirm the mood induction successfully increased negative affect and decreased positive affect, participants completed 10 items (5 positive, 5 negative) derived from the Positive and Negative Affect Schedule (PANAS; Watson, Clark, & Tellegen, 1988) before and after the movie clip. Items were rated on a 5-point Likert scale ranging from 1 (Very slightly or not at all) to 5 (Extremely), then summed for a total possible score out of 25 for both positive and negative affect.

3.4. Statistical analyses

3.4.1. Preliminary analyses

3.4.1.1. Manipulation check. A repeated-measures analysis of variance (ANOVA) was conducted as a manipulation check to confirm that the mood induction successfully induced an increase in negative affect and a decrease in positive affect.

3.4.1.2. Associations among dimensions of early life adversity. A bivariate Pearson correlation was conducted to quantify the association between experiences of deprivation and experiences of threat.

3.4.1.3. Covariates. Two potential covariates collected from parents/guardians were parents' income and education. Thus, bivariate Pearson correlations were conducted to assess whether parents' income and education were associated with markers of attention.

3.5. Main analyses

To examine the cognitive processing of both emotional and non-emotional material, we used bivariate Pearson correlations to quantify the associations of deprivation and threat with raw RTs for each valence category (i.e., happy, sad, angry, neutral) across both cue durations (i.e., 200 ms and 1000 ms) and trial types (i.e., valid and invalid). To investigate associations between dimensions of ELA and attentional engagement biases, we conducted multivariate linear regressions in which each regression simultaneously modeled the effect of one dimension of ELA (e.g., deprivation or threat as the predictor) on three outcomes: attentional engagement bias scores for happy, sad, and angry facial expressions. Separate regressions were conducted for each dimension of ELA (i.e., deprivation and threat) and each presentation time (i.e., 200 ms and 1000 ms), for a total of four regressions. To investigate associations between dimensions of ELA and attentional disengagement biases, we conducted multivariate linear regressions in which each regression simultaneously modeled the effect of one dimension of ELA (e.g., deprivation or threat as the predictor) on three outcomes: attentional disengagement bias scores for happy, sad, and angry facial expressions. Separate regressions were conducted for each dimension of ELA (i.e., deprivation and threat) and each presentation time (i.e., 200 ms and 1000 ms), for a total of four regressions. All analyses were completed in SPSS (Version 29).

4. Results

4.1. Preliminary analyses

4.1.1. Manipulation check

The two-way Time (before mood induction, after mood induction) by Valence (positive, negative) repeated measures ANOVA on affect was significant, $F(1, 77) = 24.10$, $p < 0.001$, partial $\eta^2 = 0.238$. Negative affect successfully increased from pre- ($M = 6.06$) to post-induction ($M = 7.96$), $t(80) = 3.090$, $p = 0.003$, and positive affect significantly decreased from pre- ($M = 11.75$) to post-induction ($M = 8.10$), $t(78) = 5.020$, $p < 0.001$.

4.1.2. Associations among dimensions of early life adversity

Experiences of deprivation and threat were significantly correlated, $r = 0.550$, $p < .001$.

4.1.3. Covariates

Neither parents' income nor education were significantly associated with markers of attention, $ps > 0.100$, and thus, were not retained as covariates in the main analyses.

4.2. Main analyses

4.2.1. Raw reaction times

Experiences of deprivation were positively associated with raw RTs across valence categories at the 200 ms cue duration, $rs \geq 0.22$, $ps \leq 0.046$. Specifically, greater experiences of deprivation were associated with slower RTs to *happy*, $rs \geq 0.30$, $ps \leq 0.007$, *sad*, $rs \geq 0.26$, $ps \leq 0.018$, *angry*, $rs \geq 0.22$, $ps \leq 0.046$, and *neutral*, $rs \geq 0.25$, $ps \leq 0.025$, facial expressions for both valid and invalid trials. However, at the 1000 ms cue duration, experiences of deprivation were not significantly associated with raw RTs for any valence category regardless of trial type, $rs \leq 0.18$, $ps \geq 0.098$. Further, experiences of threat were not significantly associated with raw RTs for any valence category regardless of trial type at the 200 ms, $rs \leq 0.19$, $ps \geq 0.093$, or the 1000 ms cue duration, $rs \leq 0.18$, $ps \geq 0.108$. See Online Supplement Table S3.

4.2.2. Attentional engagement biases

As expected in Hypothesis 1, experiences of deprivation did not significantly predict attentional engagement biases for any valence at 200 ms, $Bs \leq |2.24|$, $ps \geq 0.394$, or 1000 ms, $Bs \leq |4.33|$, $ps \geq 0.110$. Similarly, yet in contrast with Hypothesis 1, experiences of threat did not significantly predict attentional engagement biases for any valence at 200 ms, $Bs \leq 1.25$, $ps \geq 0.358$, or 1000 ms, $Bs \leq 2.68$, $ps \geq 0.061$. See Online Supplement Tables S4 and S5.

4.2.3. Attentional disengagement biases

As expected in Hypothesis 2, experiences of deprivation did not significantly predict attentional disengagement biases for any valence at 200 ms, $Bs \leq 3.88$, $ps \geq 0.106$, or 1000 ms, $Bs \leq 3.08$, $ps \geq 0.285$. Similarly, yet in contrast with Hypothesis 2, experiences of threat did not significantly predict attentional disengagement biases for any valence at 200 ms, $Bs \leq |0.31|$, $ps \geq 0.807$. However, as expected in Hypothesis 2, experiences of threat significantly predicted attentional disengagement biases across valences at 1000 ms, Wilk's $\lambda = 0.88$, $F(3, 78) = 3.531$, $p = .019$, partial $\eta^2 = 0.120$. Specifically, greater experiences of threat were associated with slower disengagement from *happy*, $B = 4.15$, $p = .005$, partial $\eta^2 = 0.092$, *sad*, $B = 3.33$, $p = .036$, partial $\eta^2 = 0.054$, and *angry*, $B = 3.91$, $p = .006$, partial $\eta^2 = 0.092$, facial expressions (see Fig. 2 and Online Supplement Tables S6 and S7).

4.2.4. Non-preregistered analyses

We ran several additional analyses to examine the robustness of our findings. Importantly, the above findings remain consistent when the Benjamini-Hochberg approach (Benjamini & Hochberg, 1995) was used to correct for multiple testing. We also replicated our main analyses using bootstrapping to control for Type 1 Error and increase the generalizability of our sample. Finally, given alternative conceptualizations of deprivation and threat, we ran models with parental legal trouble and parental mental illness removed from deprivation and with emotional abuse removed from threat, and all findings remained consistent. See Online Supplement Tables S8-S13 for bootstrapping results and Tables S14-S18 for alternate deprivation and threat model results.

5. Discussion

This study was the first to investigate the associations between dimensions of ELA (i.e., deprivation and threat) and the cognitive processing of multiple emotions (i.e., happy, sad, angry, and neutral stimuli) in a sample of youth. First, while experiences of threat were not associated with raw RTs for any valence category, experiences of deprivation were positively associated with raw RTs for all valence categories across both valid and invalid trials at the 200 ms cue duration. In other words, youth with *greater* deprivation exposure were *slower* to react to emotional and non-emotional expressions alike. Further, whereas experiences of deprivation did not predict attentional engagement or disengagement bias scores for any valence, experiences of threat predicted positive attentional disengagement bias scores for all valenced expressions at the 1000 ms cue duration, indicating that youth with *greater* threat exposure were *slower* to shift their attention away from emotional expressions.

Results support the tenets of DMAP, suggesting that experiences of deprivation and threat precipitate unique neurodevelopmental alterations in systems implicated in cognition and emotion (Sheridan & McLaughlin, 2020). Indeed, the present associations between deprivation and raw reaction times are consistent with deficits in executive function, which prior research has linked to alterations in the prefrontal cortex following experiences of deprivation (Mueller et al., 2010; Sheridan, Sarsour, Jutte, D'Esposito, & Boyce, 2012). Similarly, the present associations between threat and disengagement from emotional stimuli are consistent with alterations in neural circuitry in the hippocampus and amygdala, which prior research has linked to biased processing of valenced information (Pollak & Sinha, 2002; Pollak & Tolley-Schell, 2003). Moreover, findings extend the current understanding of the nature and time course of these alterations, which have broader implications for the onset and maintenance of psychopathology.

One particularly interesting finding is that experiences of threat were associated with attentional disengagement biases rather than attentional engagement biases for angry expressions. This adds to the complex body of literature finding mixed support for both engagement and disengagement biases in fear processing for those with a history of threat exposure (Blekić et al., 2021; Schäfer et al., 2023). Alterations in processing may be best explained as a difficulty disengaging from rather than quicker attention toward fearful material, though additional research is needed. Further, this study was the first to document that experiences of threat were associated with disengagement biases for happy and sad expressions. Indeed, we found support for disengagement biases across emotional expressions at the 1000 ms cue duration. These findings not only suggest that experiences of threat impact emotional processing beyond fear-inducing stimuli, but also that these impacts may act exclusively on late attentional processes. If replicated, findings could have applications for early intervention given substantiated links between disengagement biases and the onset and maintenance of

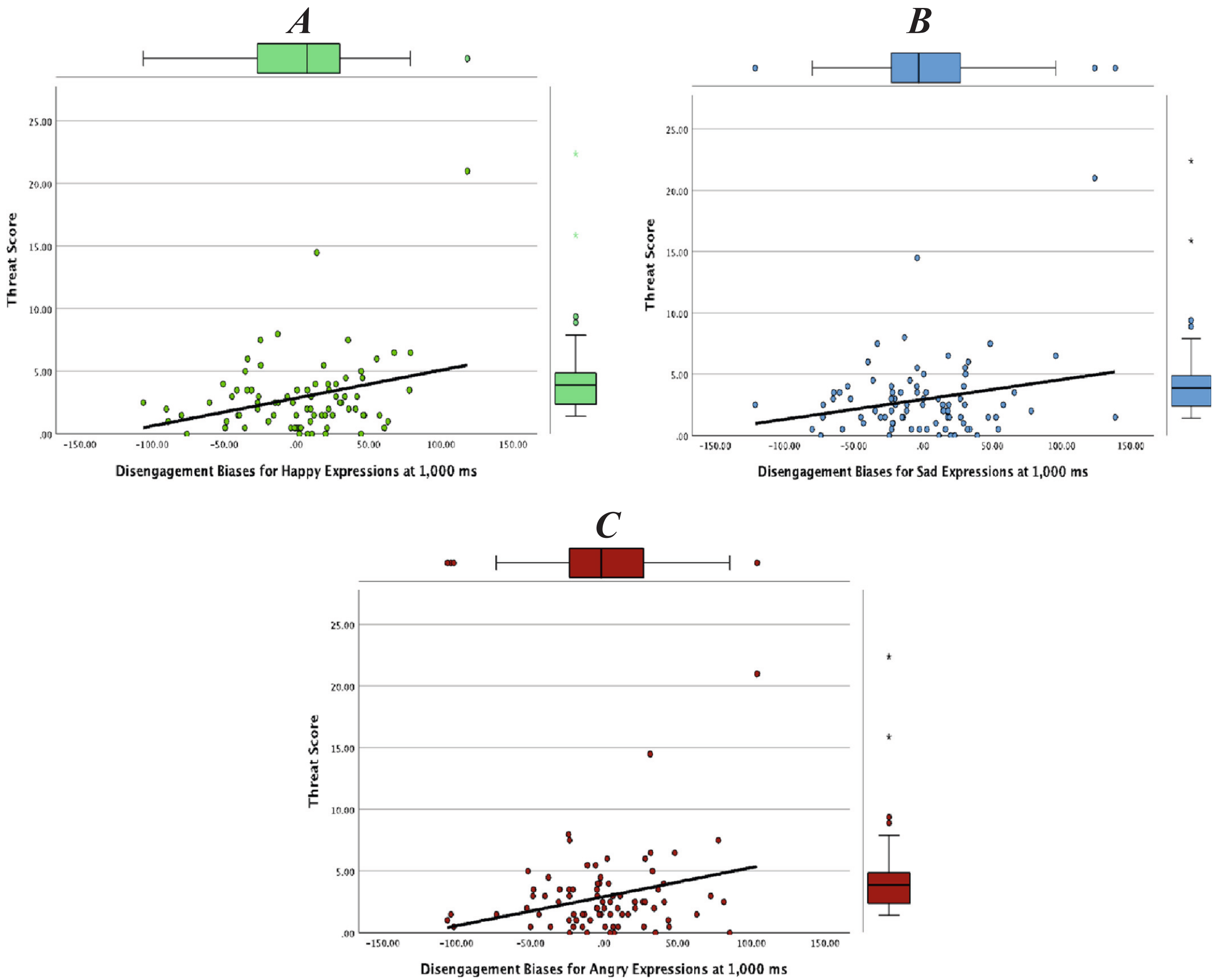

Fig. 2. Association of threat with disengagement biases for happy (panel A), sad (panel B), and angry (panel C) expressions at the 1000 ms cue duration.

depressive disorders (Kellough et al., 2008; Koster, De Raedt, et al., 2005).

Finally, while experiences of deprivation were not associated with attentional engagement or disengagement biases, deprivation was positively correlated with raw RTs across categories (i.e., happy, sad, angry, and neutral) and trial types (valid and invalid) at the 200 ms cue duration. These findings are consistent with the theory that experiences of deprivation precipitate widespread alterations in cognitive processing (McLaughlin et al., 2014), which would result in material being processed more slowly regardless of emotional valence. Moreover, these correlations were significant for the short stimulus duration only, which suggests that experiences of deprivation may act exclusively on early attentional processes.

The present study has several limitations that future research should seek to address. First, while the Affective Posner Task has advantages over alternative cognitive task paradigms as a widely used and standardized measure of reaction-based attention, extraneous factors (e.g., fatigue, environmental distractions) can influence reaction times, and attention measured in the laboratory may differ from attention in naturalistic settings. As such, it is essential to replicate and further explore these findings with other methods, such as eye-tracking, in and out of the laboratory. Second, while the current work extracted dimensions of ELA from the TESI-C (similar to Chahal et al., 2021; Ho et al., 2024; King et al., 2017, 2020), it is important for researchers to develop and validate a measure of deprivation and threat in youth. Further, though the events endorsed by youth spanned the first 13 years of life, prospective longitudinal work should replicate these findings. Moreover, while the present sample was comparable to other community-based convenience samples in terms of levels of endorsement across experiences of ELA, future research should include additional measures of deprivation, such as cognitive stimulation. Similarly, while the present sample was demographically representative of the Vancouver community from which it was drawn, future research should extend these findings in larger populations and those at greater risk for ELA exposure.

Altogether, these findings advance DMAP by further elucidating the cognitive and emotional mechanisms contributing to adverse developmental outcomes following early experiences of deprivation and threat. We found deprivation was associated with widespread alterations in attentional processing regardless of valence, while threat was associated with alterations in attentional biases for emotional material. Further, our findings suggest that time course may play a unique and pivotal role in these alterations, namely that experiences of deprivation may impact early attentional processes while experiences of threat may impact late attentional processes. These results have major implications for future investigations using DMAP, as they highlight the importance of exploring across the scope of valenced stimuli and including time course when assessing cognitive processing of emotion. As such, findings have critical applications for clinical practice, suggesting adversity-exposed youth may benefit from early interventions designed to correct biased cognition (e.g., cognitive behavioral therapy or cognitive bias modification), which can be tailored based on the nature and time course of the dimension-dependent alterations.

CRediT authorship contribution statement

Taylyn Jameson: Writing – review & editing, Writing – original draft, Visualization, Methodology, Investigation, Formal analysis, Conceptualization. **Lisa Yang:** Writing – review & editing, Investigation, Formal analysis. **Ellen Jopling:** Writing – review & editing, Project administration, Methodology, Investigation. **Katerina Rnic:** Writing – review & editing, Methodology, Investigation. **Ashley M. Battaglini:** Writing – review & editing, Investigation. **Bronwen Grocott:** Writing – review & editing. **Alison Nutini:** Writing – review & editing, Project administration, Methodology, Investigation. **Joelle LeMoult:** Writing – review & editing, Supervision, Project administration, Methodology, Investigation, Funding acquisition, Formal analysis, Conceptualization.

Declaration of competing interest

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Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.chiabu.2024.107084.

Data availability

Data will be made available on request.

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