Difficulties with emotion regulation moderates the relationship between child maltreatment and emotion recognition

Polly Cheng, MA

McGill University, Educational and Counselling Psychology, Canada

Rachel Langevin, PhD*

McGill University, Educational and Counselling Psychology, Canada

*Corresponding Author:
Rachel Langevin
Educational and Counselling Psychology
Education Building (room 614)
3700 McTavish St.
McGill University
Montreal, H3A 1Y2
Canada
Email: rachel.langevin@mcgill.ca

Other author contact details:

Polly Cheng: polly.cheng@mail.mcgill.ca

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Abstract

Background: Emotion regulation (ER) and emotion recognition (ERC) deficits are frequently observed in the sequelae of child maltreatment (CM). Despite a wealth of research on emotional functioning, these emotional processes are often presented as independent but related functions. As such, there is currently no theoretical framework on how different components of emotional competence, such as ER and ERC, may be related to one another. **Objective**: The present study aims to empirically assess the relationship between ER and ERC by examining the moderating role of ER in the relationship between CM and ERC. A secondary objective is to explore whether unique CM subtypes, recognition of specific emotions, and ER dimensions are driving this relationship. **Methods:** A sample of 413 emerging adults (18-25 years) completed an online survey (CM history, ER difficulties) and an ERC task. **Results**: Moderation analysis indicated that in emerging adults with ER difficulties, as CM increased, the accuracy for negative emotions decreased (B = -.02, SE = .01, t = -2.50, p = .01). Exploratory analyses revealed that most CM subtypes (sexual abuse, emotional maltreatment, and exposure to domestic violence) significantly interacted with two ER dimensions (difficulty with impulsivity and limited access to ER strategies) and was associated with disgust, but not sadness, fear, nor anger recognition. **Conclusion**s: These results provide evidence for ERC impairment in emerging adults with more CM experiences and ER difficulties. The interplay between ER and ERC is important to consider in the study and treatment of CM.

Keywords: child maltreatment, emotion regulation, emotion recognition, emotional competence, emotional functioning, emerging adults

Introduction

Child maltreatment (CM) is robustly associated with impairments in emotion regulation (ER) and emotion recognition (ERC), with negative effects persisting into adulthood (McCrory et al., 2017; McLaughlin et al., 2020). While ER is the ability to appropriately and flexibly modulate one's affect based upon situational demands (Gratz & Roemer, 2004), ERC is the ability to accurately perceive and interpret emotional states expressed by others (Scherer & Scherer, 2011). Despite a wealth of research on ER and ERC and their relevance as primary domains of emotional competence (Saarni, 2000), there remains a lack of a unifying theory of emotional functioning explaining how different domains of emotional competence relate to one another (Milojevich et al., 2021). Considering the abundance of research on ER and ERC, there is a surprising dearth of empirical research investigating the relationship between these two domains of emotional competence, least of all in people with a history of CM. The primary objective of the current study was to empirically examine if ER moderates the association between CM and ERC, in emerging adults. The secondary objective was more exploratory in nature and sought to investigate whether unique CM subtypes, recognition of specific emotions, and ER dimensions were driving this relationship.

Emerging adulthood, a lengthy period of transition marked by the exploration of identity and instability (Arnett, 2007), is a period during which emotional competence improves (Parker et al., 2005) and is aligned with the maturation of the prefrontal cortex, central to executive functioning and emotion regulation (Smolker et al., 2018). Additionally, emerging adults with a history of child maltreatment are especially vulnerable to the development of psychopathology (Widom et al., 2007) . As such, it is important to understand the nature of the relationship between ER and ERC in emerging adults with a history of CM since both ER and ERC are

implicated in the development of psychopathology (e.g., Milojevich et al., 2019; Tognin et al., 2020) and revictimization (e.g., Lilly et al., 2014), and are thus essential for well-being. Further, research demonstrating differential relationships between CM and ERC (Turgeon et al., 2020) and CM and ER (Cheng & Langevin, 2022) urges scholars to examine more closely the unique associations between CM subtypes and emotional competence during this transitional period. With such great variance and diversity within the CM population, emerging adulthood is a sensitive period in the continued development of emotional competence which has potential for intervention and a positive lasting impact.

The Moderating Role of Emotion Regulation

ERC is central to monitoring the environment for threats; both the ability to recognize and regulate emotions facilitates social interactions (Lopes et al., 2011; Miller et al., 2005). Robust neuroimaging evidence for impairments in brain activity during ERC tasks show that people with a CM history, relative to those without, have a heightened amygdala response toward fearful and angry faces (see Hein & Monk, 2017 for a review), indicative of sensitivity towards negative emotions (Dannlowski et al., 2012). This attentional bias in CM survivors is present irrespective of psychopathology (Letkiewicz et al., 2020). Nevertheless, the behavioural evidence is inconsistent with some studies indicating greater accuracy in recognizing negative facial expressions and others demonstrating the reverse (see Bérubé et al., 2021 for a review). Despite extensive research on ER and ERC, there is a dearth of studies on the relationship between ER and ERC in people with a history of CM.

Considering effective ER is characterized by the ability to flexibly and successfully apply strategies under various conditions (Aldao et al., 2009), ERC may be moderated by ER abilities. Since threatening stimuli triggers automatic emotional reactivity, engagement with the stimuli

requires an individual to be able to manage this automatic response. As such, the ability to effectively regulate emotional reactivity likely affects how well someone is able to re-engage with the threatening stimuli after the initial reactivity. In fact, two studies have demonstrated ER as a moderator in relation to ERC (Aldinger et al., 2013; England-Mason et al., 2018). In the first study, women with more severe depression were generally worse at identifying angry facial expressions but not any other basic emotions, however, expressive suppression - an ER strategy - moderated this relationship such that women who were more severely depressed and less likely to use that strategy were less accurate in recognizing angry facial expressions (Aldinger et al., 2013). In contrast, in participants with high expressive suppression, depression severity did not affect the accuracy of anger recognition.

The second study demonstrated a similar trend of results with attentional bias as the outcome. England-Mason and colleagues (2018) found that post-partum women with a CM history and less ER difficulties were less inclined to avoid emotional stimuli. These findings suggest that participants with a CM history and greater ER abilities were better able to engage with and process emotional stimuli compared with those with poorer ER abilities. This improved performance may be due to a greater capacity to tolerate discomfort, enabling the individual to address, rather than avoid, the experienced distress. In summary, both studies demonstrated that the ability to accurately process emotion information depended on ER abilities.

Maltreatment Subtypes, ER Dimensions, and Recognition of Specific Emotions

CM is frequently studied as a general category or as an individual subtype, however, there are also differential associations between CM subtypes and various outcomes (e.g., psychopathology, internalizing and externalizing behaviours, ERC, ER; Cheng & Langevin, 2022; Cecil et al., 2017; de Oliveira et al., 2018). Given the frequent co-occurrence of CM

subtypes (Kim et al., 2017), Cecil and colleagues (2017) demonstrated the importance of accounting for the effects of CM subtypes to differentiate between unique and shared associations. They showed that while CM subtypes were individually associated with mental health outcomes, emotional abuse emerged as a primary predictor of mental health outcomes when all CM subtypes were included in the analysis (Cecil et al., 2017). Consequently, the current study sought to examine whether specific CM subtypes, taking into account other CM subtypes, uniquely interacted with ER.

An emergent model, the dimensional model of adversity and psychopathology (DMAP), provides a guiding theory on how threat and deprivation differentially impact developmental cognitive and emotional functioning (Mclaughlin & Sheridan, 2016). DMAP stipulates that repeated exposure to threat in early childhood, such as childhood physical and sexual abuse, and exposure to domestic violence, disrupts fear and reward-learning processes which is associated with emotion dysregulation (Milojevich et al., 2019; Weissman et al., 2019), heightened emotion reactivity (Pollak & Sinha, 2002), and difficulty discriminating between threatening and safety cues (Mclaughlin & Sheridan, 2016). Conversely, early deprivation, such as in cases of neglect, where there is a deficit of social and cognitive input, is associated with a detrimental impact on executive functioning (Mclaughlin & Sheridan, 2016). While emotional maltreatment is not explicitly discussed within DMAP, this maltreatment subtype consists of both emotional abuse and neglect which falls along the continuum of both threat and deprivation. As such, emotional maltreatment will be categorized as threat in the present study since it has strong associations with emotional processes (Burns et al., 2012; Christ et al., 2019).

Similar to the study of CM, ER is typically studied as a broad construct involving multiple dimensions. Maladaptive ER strategies include persistent and inflexible avoidance or

control of emotions, and adaptive strategies include those that flexibly enhance the awareness, understanding, and acceptance of emotions and emotional states (Gratz & Roemer, 2004). Gratz and Roemer (2004) identified six dimensions of difficulties with ER: nonacceptance of emotional responses, difficulties engaging in goal-directed behaviour, impulse control difficulties, lack of emotional awareness, limited access to ER strategies, and lack of emotional clarity. Correlations between these dimensions ranged from weak to moderate (e.g., r = .08 - .44; Greene et al., 2021) demonstrating that individuals may have difficulty with one dimension but not with another. In fact, emotional maltreatment is more strongly correlated with ER difficulties relative to other CM subtypes (Burns et al., 2010; Greene et al., 2021; Rosenstein et al., 2018), and specifically, emotional maltreatment was most strongly associated with limited access to ER strategies (Burns et al., 2010; Greene et al., 2021; Rosenstein et al., 2018). Additionally, emotional maltreatment was a stronger predictor of ER difficulties than sexual abuse and physical abuse (Burns et al., 2010; Christ et al., 2019), though these results are inconsistent (Kim & Cicchetti, 2010). As such, there is empirical support for differential relationships between CM subtypes and specific ER dimensions.

Along with differential relationships between CM subtypes and ER, CM subtypes have also been associated with the recognition of specific emotions. While CM has generally been associated with impairments in the recognition of negative emotions as a whole (Bérubé et al., 2020; Catalana et al., 2020), there is also some evidence for specific associations. Although there are inconsistencies between studies, physical abuse was associated with reduced accuracy in recognizing fearful, angry, sad, and happy expressions; neglect, sexual abuse, and emotional maltreatment were all associated with reduced accuracy for anger (Cheng & Langevin, 2022; Turgeon et al., 2020; Wagner et al., 2015). There is also support for emotional maltreatment and

increased accuracy for anger and fear (Turgeon et al., 2020). Like ER, there is empirical support for differential relationships between CM subtypes and negative ERC. Given the lack of research on that topic, we did not make any specific hypotheses regarding the specific ER dimensions or recognition of emotions and decided to take a more exploratory approach for these dimensions.

The Current Study

The extant empirical research is currently limited in providing a sense of how ERC and ER are jointly impacted by CM. Some research suggests that ER may be a moderator (Aldinger et al., 2013; England-Mason et al., 2018). As such, the primary objective of the current study was to clarify the relationship between ER and ERC and examine whether ER moderates the relationship between CM and ERC. We hypothesized that ER moderates the association between CM and ERC such that difficulties with ER are expected to worsen ERC outcomes in emerging adults with a CM history. Alternatively, our null hypothesis is that impairments in ERC and ER are co-morbid conditions independently associated with CM. Given the robust association between CM and the recognition of negative emotional expressions (Bérubé et al., 2021), the current study focused on negative emotions (anger, fear, sadness, and disgust). Our secondary objective was to explore whether specific CM subtypes and ER dimensions predict the recognition of specific emotions. Based on DMAP, we hypothesize that physical abuse, sexual abuse, emotional maltreatment, and exposure to domestic violence will have stronger associations in the moderation model compared with neglect since both ER and ERC are emotional processes. By identifying the unique effects of CM subtypes on ERC and specific ER dimensions, and exploring how both constructs relate to one another in the context of CM, the fine-grained analyses conducted as part of the current study will contribute to a better understanding of emotional competence in survivors of CM.

Method

Sample and Procedures

The original sample consisted of 578 emerging adult participants (18-25 years old). Sixty-four participants did not complete the ERC task and an additional 86 participants experienced technical difficulties during the ERC task. As such, 150 participants were excluded[1], resulting in a final sample of 428 participants (M = 21.15, SD = 2.08). Participants were recruited through social media advertisements, online research platforms, and departmental and faculty list-servs across Canada. Informed consent was obtained from all study participants. The primary researcher's institutional ethics review board approved the study. The online survey, available in French and English, required approximately 45 minutes to complete. Participants were subsequently entered into a drawing to win two iPads. To ensure the quality of responses, participants were removed from the dataset if they: (a) completed less than 75% of the survey; (b) completed the survey in 15 minutes or less (half of modal time); (c) failed at least four of seven attention check questions; or (d) indicated that we should not use their responses.

Measures

Child maltreatment history. Participants completed the Early Trauma Inventory Self Report – Short Form (ETISR-SF; Bremner et al., 2007) to assess childhood experiences (before the age of 18) of physical abuse (five items; α = .71), sexual abuse (six items; α = .85) and emotional maltreatment (five items; α = .85). The neglect subscale from the ISPCAN Child Abuse Screening Tool – Retrospective Version (ICAST-R; Dunne et al., 2009) was used to assess physical/supervisory neglect (five items; α = .67), and three adapted items (α = .76) from

[1] Additional analyses were conducted comparing demographic and focal variables between included and excluded participants. No significant differences were found with the exception that the group with technical difficulties performed significantly worse than the group without difficulties on the ERI, as expected.

the Conflict Tactics Scale 2 (CTS2; Straus et al., 1996) assessed exposure to domestic violence. Participants responded dichotomously (i.e., yes, or no) to items regarding their experience of specific behaviours associated with each CM subtype. A total CM score was computed by summing the number of "yes" responses across the 24-items. The internal consistency of this CM measure was good (α = .90). Sample items include, "Were you often told you were no good by a parent or caregiver?" and "Were you ever pushed or shoved by a parent or caregiver?". Additionally, the total number of "yes" responses were summed to create five individual scores for each CM subtype.

Emotion regulation. ER was assessed with the Difficulties in Emotion Regulation Scale – Brief Version (DERS-18; Victor & Klonsky, 2016). The DERS-18 is composed of six subscales (three items each): nonacceptance of emotional responses (Nonaccept: α = .44), difficulties engaging in goal-directed behaviour (Goals*;* α = .91), difficulties with impulsivity (Impulse; α = .90), lack of emotional awareness (Aware: α = .38), limited access to ER strategies (Strategies; α = .82), and lack of emotional clarity (Clarity*;* α = .84). The total scale demonstrated good internal consistency (α = .84). Items were rated on a 5-point scale from 1 (almost never) to 5 (almost always). Higher scores corresponded to a greater difficulty with ER. Sample items include, "I am confused about how I feel" and "When I'm upset, I lose control over my behaviours". A total summed score was used for ER with scores ranging from 21 to 80. The sum of scores for each subscale was used for each dimension. Due to the low internal consistencies of the Aware and Nonaccept subscales, these subscales were excluded from analyses involving individual dimensions.

Negative emotion recognition. The recognition of negative emotions (sadness, anger, fear, disgust) was assessed using the Emotion Recognition Index (ERI; Scherer & Scherer,

2011). The ERI is a computer-based rapid test of ERC abilities and consists of two subtests (vocal and facial); this study only used the test of facial ERC. Participants were asked to select the emotion that best described the displayed facial expression. A total of 30 trials was displayed to participants for 3 seconds each. As joy was excluded in this study, 25 trials were included in the calculation of scores. The mean accuracy scores of each negative emotion in the current sample ($\bar{X}$ = .49 - .76) were comparable to the mean scores in the initial study ($\bar{X}$ = .54 - .90; Scherer & Scherer, 2011) with the exception of disgust ($\bar{X}$ = with .90), which was lower in the current sample ($\bar{X}$ = .76). The mean accuracy score was calculated by summing the number of correct responses then dividing by the total number of trials and multiplied by 100 to get a percentage score. A higher score is reflective of greater accuracy. The overall mean accuracy scores for negative emotions and four individual emotions were computed.

Covariates. Self-reported gender (0 = male, 1 = female) and ethnicity (0 = Caucasian, 1 = BIPOC) were dummy coded and included as covariates as differences in these groups have been reported in ERC (Scherer & Scherer, 2011; Thompson & Voyer, 2014). To control for psychological distress, the Psychiatric Symptoms Index-Short version (PSI-14; Boyer et al., 1993) was used. The PSI-14 assesses for symptoms of anxiety, depression, cognitive problems, and irritability in the past week (14 items; e.g., “Did you lose your temper?”, “Do you cry easily or feel like crying”). Participants rated the frequency in which they experienced each item on a 4-point scale from 0 (never) to 3 (almost always). The scale demonstrated good internal consistency (α = .89). PSI-14 scores were expressed as a percentage of the highest possible ranging from 0 to 100.

Data Analysis

All analyses were conducted using R (R Core Team, 2021). ER was tested as a moderator in the relationship between CM and negative ERC, controlling for gender, ethnicity, and psychological distress. Due to missing data for gender (n = 6) and ethnicity (n = 9), an additional 15 cases were excluded from analysis resulting in a sample of N = 413 for all analyses. Continuous variables were mean-centred. Significant interactions were probed with the Johnson-Neyman (J-N) technique and simple slopes tests.

For the exploratory analysis, we used a stepped approach by exploring one subgroup of variables at a time to reduce the number of analyses and Type I errors. In the preliminary analyses, we first investigated whether the moderation model predicted the recognition of specific emotions. Then, we examined whether specific CM subtypes and ER dimensions, in separate models, predicted the emotion(s) that were significant in the first step. Finally, significant CM subtypes and significant ER dimensions were tested to predict significant emotions. Every analysis included gender, ethnicity, relevant CM subtypes and ER dimensions as covariates. Only significant variables from the final step with CM subtypes and ER dimensions were probed using simple slope tests and the J-N technique. Due to the number of analyses conducted, the Benjamini-Hochberg procedure (Benjamini & Hochberg, 1995) was used to control for the false discovery rate, which was set to 5% (Bender & Lange, 2001; Glickman et al., 2014). The Benjamini-Hochberg procedure is recommended over a Bonferroni correction due to greater statistical power and a better balance between Type 1 and Type II errors (Glickman et al., 2014; Jafari & Ansari-Pour, 2019). As such, for the preliminary analyses (14 tests), the significance threshold was $p < .025$; for the final models (20 tests), it was $p < .008$.

Results

Descriptive Statistics

Data pertaining to sociodemographic characteristics are reported in Table 1. Means, standard deviations, and bivariate correlations between key variables are reported in Table 2. As psychological distress was associated with disgust recognition, moderation analyses controlled for this variable in addition to gender and ethnicity.

Moderation by Emotion Regulation

ER was tested as a moderator in the association between CM and ERC. Moderation analyses indicated that CM interacted with ER to predict the recognition of negative emotions (Table 3). The J-N technique revealed that negative ERC accuracy was negatively associated with CM among those with a DERS-18 score greater than 50.34 (upper 36.08% of our sample). Simple slopes follow-up tests indicated that for participants with greater ER difficulties, as CM increased, there was a decrease in accuracy for negative emotions (+1 SD: b = -0.33, 95% CI = [-0.56, -0.11], p = .003; Figure 1a). This was not true for participants with less ER difficulties (-1 SD: b = 0.08, 95% CI = [-0.22, 0.38], p = .59). Therefore, CM was associated with impairment in ERC, but only for participants with poorer ER.

Preliminary Exploratory Analyses

Further analyses using separate models were conducted to assess for the presence of the moderating effect for each negative emotion. Detailed results can be found in online supplementary materials. The moderation was significant in predicting disgust only (Table S1). Since disgust was the only significant emotion that emerged, subsequent analyses were conducted to determine whether specific CM subtypes interacted with ER to predict disgust. Moderation analyses indicated that sexual abuse, emotional maltreatment, and exposure to

domestic violence, but not physical abuse or neglect, interacted with ER to predict disgust (Table S2). The next step in the analyses assessed for the presence of a moderating effect by each ER dimension. Moderation analyses indicated that CM interacted with Impulse and Strategies, but not Goals or Clarity, to predict disgust (Table S3).

Exploratory Analyses: Final Model

The previous analyses indicated that three CM subtypes (sexual abuse, emotional maltreatment, and exposure to domestic violence) and two ER dimensions (Impulse and Strategies) were significant in predicting disgust. As such, six moderation models were tested to predict disgust. The interactions between emotional maltreatment and Impulse (Table 4), and sexual abuse and exposure to domestic violence and Strategies (Table 5) were significant.

Impulse was examined as a moderator between CM subtypes and disgust accuracy. Emotional maltreatment interacted with Impulse to predict disgust accuracy. Individuals with a history of emotional maltreatment scoring higher than 13.41 (upper 3.39% of our sample) on Impulse were impaired in their ability to recognize disgust. Additionally, individuals with a history of emotional maltreatment scoring lower than 3.31 on Impulse (lower 15.98% of our sample) were better at recognizing disgust. Therefore, those with more experiences emotional maltreatment, and higher difficulties managing impulse control demonstrated reduced accuracy for disgust. In contrast, those with less experiences of emotional maltreatment and less difficulties managing impulse control were better at recognizing disgust. See Figure 1b for simple slopes and Table S4 in supplementary materials for detailed results of simple slopes follow-up tests.

Strategies was evaluated as a moderator between CM subtypes and disgust accuracy. Sexual abuse and exposure to domestic violence each interacted with Strategies to predict disgust

accuracy. The J-N technique indicated that individuals with a history of sexual abuse scoring higher than 10.64 (upper 16.46% of our sample) on Strategies were impaired in their ability to recognize disgust; and for exposure to domestic violence, Strategies scores had to be higher than and 13.06 (upper 4.60% of our sample). Additionally, individuals with a history of sexual abuse scoring lower than 3.07 on Strategies (lower 15.98% of our sample) were better at recognizing disgust; for exposure to domestic violence, Strategies scores had to be lower than 5.44 (lower 40.92% of our sample), respectively. Therefore, those with more experiences of sexual abuse and exposure to domestic violence and high difficulty accessing ER strategies demonstrated reduced accuracy for disgust. In contrast, those with less experiences of sexual abuse and exposure to domestic violence and less difficulties with accessing ER strategies were better at recognizing disgust. See Figures 1c-d for simple slopes and Table S4 in supplementary materials for detailed results of simple slopes follow-up tests.

Discussion

Both ER and ERC are implicated in the sequelae of child maltreatment and are transdiagnostic mechanisms in the development of psychopathology (McLaughlin et al., 2020). Although ER and ERC are studied extensively as parallel pathways with CM, there is a dearth of research regarding whether and how these two domains of emotional competence are jointly impacted by CM, especially in emerging adulthood when psychopathology begins to take shape. Further, without an existing theoretical framework explaining the relationship between different components of emotional competence, this study empirically assessed the relationship between ER and ERC based on previous findings. The current study found that ER moderated the relationship between CM and the recognition of negative emotions. This interaction is consistent with our hypothesis and previous research (Aldinger et al., 2013; England-Mason et al., 2018)

and suggests that ER modulates an individual's ability to accurately recognize negative emotions. As England-Mason and colleagues (2018) posited, improved ER abilities enables individuals to engage with threatening stimuli and offset the automatic hypervigilant response towards negative emotional stimuli that often impairs ERC in adults with a CM history (Turgeon et al., 2020). For that reason, the variations across ER within and between samples in the literature may be one explanation for the inconsistent findings regarding whether CM enhances or impairs the accuracy of ERC in emerging adults. Accordingly, examining ER as a moderator in the relationship between CM subtypes and ERC is worth exploring further in future research. Our exploratory analyses provide insight into understanding the nuances of this relationship. It revealed that greater emotion regulation was also associated with better emotion recognition, but only for the recognition of disgust. Largely consistent with our hypothesis, the moderation by ER was associated with threatening CM experiences, namely sexual abuse, emotional maltreatment, and exposure to domestic violence. These threatening experiences jointly impacted both ER and ERC. However, physical abuse was non-significant in the moderation relationship while it has previously been consistently associated with deficits in ER (Kim et al., 2021). A simple explanation for this discrepancy is that physical abuse may be unrelated to the recognition of disgust or that there was not enough power in the present analysis to detect this relationship.

Why Disgust?

While there is a general consensus that the recognition of fear and anger are impacted by CM (Bérubé et al., 2021), disgust has also been found to be negatively impacted in mothers with a CM history, but to a lesser degree (Turgeon et al., 2020). Our findings are also consistent with a study that found that patients with borderline personality disorder, often characterized by ER difficulties (Sloan et al., 2017), and a history of CM were particularly impaired in their ability to

recognize disgust (Nicol et al., 2014). One potential explanation that only disgust was moderated by ER may be that it is an emotion that is more responsive to ER, relative to anger, fear, or sadness. The adaptationist model of disgust suggests that it serves different functional domains including pathogen disgust (e.g., a response to potential disease), sexual disgust (e.g., a response to maladaptive mate choice), and moral disgust (e.g., a response to moral violations; Tybur et al., 2013). With this in mind, we consider that displays of anger or fear represent more imminent signals of threat, while expressions of disgust, though still a signal of threat, may not represent imminent danger. Consistent with this hypothesis, fear and anger activate the sympathetic nervous system implicated in the flight-or-flight response while disgust generally activates the parasympathetic nervous system which is not associated with a threat response (Kreibig, 2010). Therefore, disgust serves as a more distal rather than proximal cue of threat and functions to prevent future harm whereas anger and fear serve to protect from present threat. As such, displays of disgust do not activate the fight-or-flight response and thus may be more susceptible to an individual's ER abilities affecting whether the individual responds more deliberately or automatically. Considering this is the first study to find that the interaction between CM and ER was specific to the recognition of disgust, replication studies are needed.

Our finding that Strategies and Impulse were the ER dimensions that were significant moderators is worth mentioning. These results remained significant irrespective of psychological distress. Examination of the scale items associated with the Strategies and Impulse dimensions indicated that each of these subscales represent a belief that one does not have control over their feelings (Strategies; e.g., "when I'm upset, I believe that I will remain that way for a long time") and their behaviours (Impulse; e.g., "when I'm upset, I lose control over my behaviours"). Notably, the relationship between CM subtypes and disgust recognition was significant at both

high and low levels of Strategies and Impulse. This pattern may indicate that a lack of self-efficacy towards control over one's feelings and behaviours has the potential to exacerbate ERC impairments. This lack of self-efficacy over one's feelings and behaviours is consistent with Bandura's theory of self-efficacy (Bandura, 1977). Without a belief in one's capability to have control over one's emotions or behaviours, it is difficult to draw upon any regulation strategies and execute the associated behaviours. In the case of the current study, the behaviour was to identify the displayed facial expression. Conversely, self-efficacy towards control over one's feelings and behaviours has the potential to improve ERC abilities. Accordingly, effective ER interventions may include an emphasis in the development of self-efficacy beliefs about ER in addition to practical strategies.

Limitations

There are limitations within our study that are important to address. First, we cannot make any causal claims due to the cross-sectional design. Second, the use of a convenience sample comprising of primarily white female emerging adults limits the generalizability of our results. Third, the online nature of our study is a limitation, especially for the administration of the ERI due to the possibility of distraction and technical difficulties which may have impacted the quality of the data, however, measures were taken to ensure the quality of the data. Fourth, the exploratory nature of our study may have introduced Type I errors, however, we attempted to control for both Type I and II errors by applying the Benjamini-Hochberg correction. Nonetheless, the exploratory results should be interpreted accordingly. Lastly, considering the small effect sizes of the moderation results, there may not have been enough power to detect interaction effects for the other emotions in the current sample.

There are important implications of the current study for research and practice. Although ER and ERC have largely been studied independently, our findings provide empirical support to encourage scholars to further explore the relationship between ER and ERC relative to CM. Moreover, with the implications of ERC on social relationships (Hampson et al., 2006), examination of the predictive capacity of the moderating relationship found in this study for social interactions is an interesting avenue for future research. Additionally, with disgust emerging as an important consideration for the development of psychopathology (Amoroso et al., 2020) and its close associations with sexual abuse (Badour & Feldner, 2018) our study makes an important contribution to the field of CM by providing empirical support for the interaction between most CM subtypes and ER and its association with recognition of disgust. Since psychopathology is often associated with all CM subtypes (Jaffee, 2017) and our findings demonstrated that most CM subtypes interacted with ER, it may be important to expand the study of disgust beyond sexual abuse. Indeed, survivors of physical and/or sexual abuse were more likely to report self-disgust than those without any trauma experiences (Ille et al., 2014). Another research implication is related to the finding that Strategies and Impulse, reflective of self-efficacy towards ER, were the focal ER dimensions that moderated the relationship between CM and disgust. This finding suggests that metacognitions about ER are a potential avenue of exploration to improve ERC. In fact, college students with a CM history reported more difficulties with metacognitions than their non-maltreated counterparts (Daly et al., 2017). Metacognitive development occurs in emerging adulthood and peaks in mature adulthood (Vukman, 2005). Additionally, ER was found to mediate the relationship between metacognition and post-traumatic stress symptoms in one study (Mazloom et al., 2016). Together, these findings reflect a need to focus on ER interventions in emerging adults with a CM history.

Our findings also have clinical implications. Past research has indicated that ERC improvement is a viable intervention to improve mental health outcomes (Penton-Voak et al., 2013; Wells et al., 2021). Accordingly, ER skills may provide a buffer against the negative impact of CM on ERC. Disgust is becoming increasingly relevant in the treatment of PTSD because disgust proneness has both peri- and post-traumatic associations where peritraumatic disgust proneness predicted PTSD severity and PTSD severity predicted elevated disgust (Badour & Feldner, 2018). While the recognition of disgust may be different from the experience of disgust, a neuroimaging study found that similar neural mechanisms were activated in the perception and experience of disgust (Wicker et al., 2003). Consequently, improving ER may be a viable intervention target to regulate disgust to improve post-traumatic outcomes.

The findings in the present study represent a significant contribution to the CM and emotional competence literature which has primarily focused on the impact of CM on ER and ERC separately. While CM impairs both ER and ERC independently, CM also jointly affects both components of emotional competence. Our results highlight the joint impact of ER and ERC and identifies emerging adults with CM histories to be at greater risk of impaired ERC abilities when they also have difficulties with ER. These findings emphasize the importance of ER interventions when providing treatment to emerging adults with a history of CM.

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Table 1

Socio-Demographic Characteristics

Variable	n	%
Gender*		
Female	376	87.9
Male	45	10.5
Non-binary	3	0.7
Gender-Fluid	2	0.5
Transgender	1	0.2
Ethnicity		
White	263	61.4
Black	18	4.2
Asian	88	20.6
Hispanic	14	3.3
Indigenous/Native American	5	1.2
Arab/Middle Eastern	11	2.6
Mixed race	21	4.9
Education		
Elementary school or less	1	0.2
High School	115	26.9
CEGEP or professional school	64	15
Undergraduate	209	48.8
Graduate	36	8.4
Household Income		
Less than $20 000	85	19.9
$20 000-39 999	48	11.2
$40 000-59 999	41	9.6
$60 000-79 999	32	7.5
$80 000-99 999	36	8.4
$100 000-119 999	40	9.3
$120 000 or more	57	13.3
Child Maltreatment[a]		
Neglect	192	44.9
Physical abuse	216	50.5
Sexual abuse	146	34.1
Emotional maltreatment	231	54.0
Exposure to domestic violence	177	41.1

Note. N = 428. Non-binary, gender-fluid, and transgender participants were excluded from analysis due to the small n.

[a]Frequencies reflect experience of at least one behaviour associated with each child maltreatment subtype

Table 2

Correlations and Descriptive Statistics

		2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
1.	Gender	.02	-.01	-.03	-.03	.04	-.09	-.01	-.16**	-.20**	-.17**	-.06	-.09	-.10*	.04	.07	-.02	-.001	-.06
2.	Ethnicity	-	-.05	-.04	.01	-.05	-.05	-.04	.05	-.01	.16**	.08	-.07	.03	-.12*	-.03	-.07	-.12*	-.05
3.	Psychological distress		-	.66**	.47**	.46**	.53**	.58**	.40**	.32**	.30**	.38**	.22**	.26**	-.08	-.07	-.07	.03	-.12*
4.	DERS			-	.67**	.75**	.75**	.83**	.37**	.29**	.26**	.33**	.27**	.20**	-.11*	-.02	-.05	-.05	-.15**
5.	Clarity				-	.28**	.33**	.41**	.34**	.28**	.22**	.28**	.25**	.21**	-.15**	-.15**	-.04	-.03	-.16**
6.	Goals					-	.47**	.59**	.19**	.13**	.12*	.17**	.18**	.06	-.02	.06	-.05	-.001	-.07
7.	Impulse						-	.60**	.33**	.31**	.27**	.27**	.20**	.16**	-.14**	-.05	-.09	-.05	-.13**
8.	Strategies							-	.29**	.23**	.19**	.29**	.16**	.17**	-.08	.02	-.02	-.03	-.13**
9.	Childhood Maltreatment								-	.76**	.77**	.82**	.65**	.71**	-.14**	-.09	-.01	-.05	-.12*
10.	Neglect									-	.51**	.52**	.43**	.42**	-.17**	-.10*	-.04	-.07	-.13**
11.	Physical abuse										-	.54**	.30**	.56**	-.14**	-.12*	-.07	.004	-.11*
12.	Emotional maltreatment											-	.32**	.53**	-.09	-.01	.05	-.10*	-.09
13.	Sexual abuse												-	.25**	-.09	-.06	-.03	-.02	-.08
14.	Exposure to DV													-	-.05	-.07	.03	.01	-.04
15.	Negative Emotions														-	.53**	.60**	.62**	.55**
16.	Anger															-	.13**	.05	.07
17.	Fear																-	.12*	.42**
18.	Sadness																	-	.12*
19.	Disgust																		-
	Mean	-	37.87	46.40	7.18	9.50	6.02	6.98	5.17	0.80	1.07	1.61	0.94	0.75	0.63	0.49	0.68	0.76	0.69
	SD	-	18.86	11.38	3.06	3.45	3.22	3.33	5.19	1.15	1.34	1.84	1.62	1.04	0.10	0.17	0.14	0.18	0.22

Notes. Gender dummy coded female = 0; male = 1; ethnicity dummy coded white/Caucasian = 0; BIPOC = 1; DERS = difficulty with ER; DV = domestic violence; Clarity = lack of emotional clarity; Goals = difficulties engaging in goal-directed behaviour; Strategies = limited access to ER strategies; Impulse = difficulties with impulsivity; DV = domestic violence. * $p < .05$; ** $p < .01$; *** $p < .001$

Table 3

Moderation analysis predicting accuracy rate in recognition of negative emotions

	B	***SE***	***p***	R^2	ΔR^2
Negative Emotions				.05	
Gender	0.61	1.53	.694		
Ethnicity	-2.38*	0.97	.015		
Psychological distress	-.004	0.04	.902		
Child maltreatment	-0.13	0.11	.061		
Emotion regulation	-0.04	0.06	.449		
Child maltreatment*DERS	-0.02*	0.01	.013		.015*

Notes. Unstandardized estimates presented. Gender dummy coded female = 0; male = 1; ethnicity dummy coded white/Caucasian = 0; BIPOC = 1; DERS = difficulty with ER. Coefficients are considered significant if the 95% confidence interval does not contain zero. * $p < .025$ (Benjamini-Hochberg correction).

Table 4

Moderation analyses predicting accuracy rate in recognition of disgust by child maltreatment subtypes and impulse

		Model 1 Sexual abuse			***Model 2*** Emotional maltreatment			***Model 3*** Exposure to domestic violence		
		B	***SE***	***p***	***B***	***SE***	***p***	***B***	***SE***	***p***
Step 1	**Control Variables**									
	Gender	-6.29	3.51	.074	-6.10	3.50	.082	-6.06	3.52	.086
	Ethnicity	-1.46	2.23	.513	-1.97	2.24	.379	-1.89	2.25	.402
	Psychological distress	-0.04	0.08	.618	-0.02	0.08	.754	-0.03	0.08	.676
	Child Maltreatment Variables									
	Neglect	-1.55	1.20	.200	-1.42	1.20	.237	-1.42	1.22	.245
	Physical abuse	-1.07	1.07	.320	-0.95	1.08	.376	-0.95	1.09	.381
	Sexual abuse	0.14	0.76	.059	-0.12	0.74	.868	-0.26	0.74	.587
	Emotional maltreatment	0.54	0.77	.482	0.48*	0.77	.010	0.42	0.78	.726
	Exposure to DV	1.22	1.30	.352	1.07	1.30	.410	1.21	1.31	.068
	Emotion Regulation Variables									
	Clarity	-0.65	0.41	.108	-0.72	0.41	.075	-0.70	0.41	.087
	Goals	0.22	0.39	.569	0.24	0.39	.541	0.26	0.39	.509
	Strategies	-0.39	0.48	.415	-0.32	0.48	.506	-0.38	0.48	.425
	Impulse	-0.07	0.44	.491	-0.09	0.43	.214	-0.11	0.44	.624
Step 2	**Interaction**									
	Sexual abuse* Impulse	-0.43	0.18	.015						
	Emotional maltreatment* Impulse				-0.47*	0.17	.007			
	Exposure to DV*Impulse							-0.48	0.30	.112
	$\mathbf{R^2}$	.06			.07			.05		
	$\boldsymbol{\Delta R^2}$	.014*			.017*			.006		

Notes. Models 1 – 4 represent interactions between neglect, sexual abuse, emotional maltreatment, and exposure to DV, respectively, and impulse. Unstandardized estimates presented. Gender dummy coded female = 0; male = 1; ethnicity dummy coded white/Caucasian = 0; BIPOC = 1; DV = domestic violence; Clarity = lack of emotional clarity; Goals = difficulties engaging in goal-directed behaviour; Strategies = limited access to ER strategies; Impulse = difficulties with impulsivity. *Significance threshold determined as $p < .008$ after Benjamini-Hochberg correction.

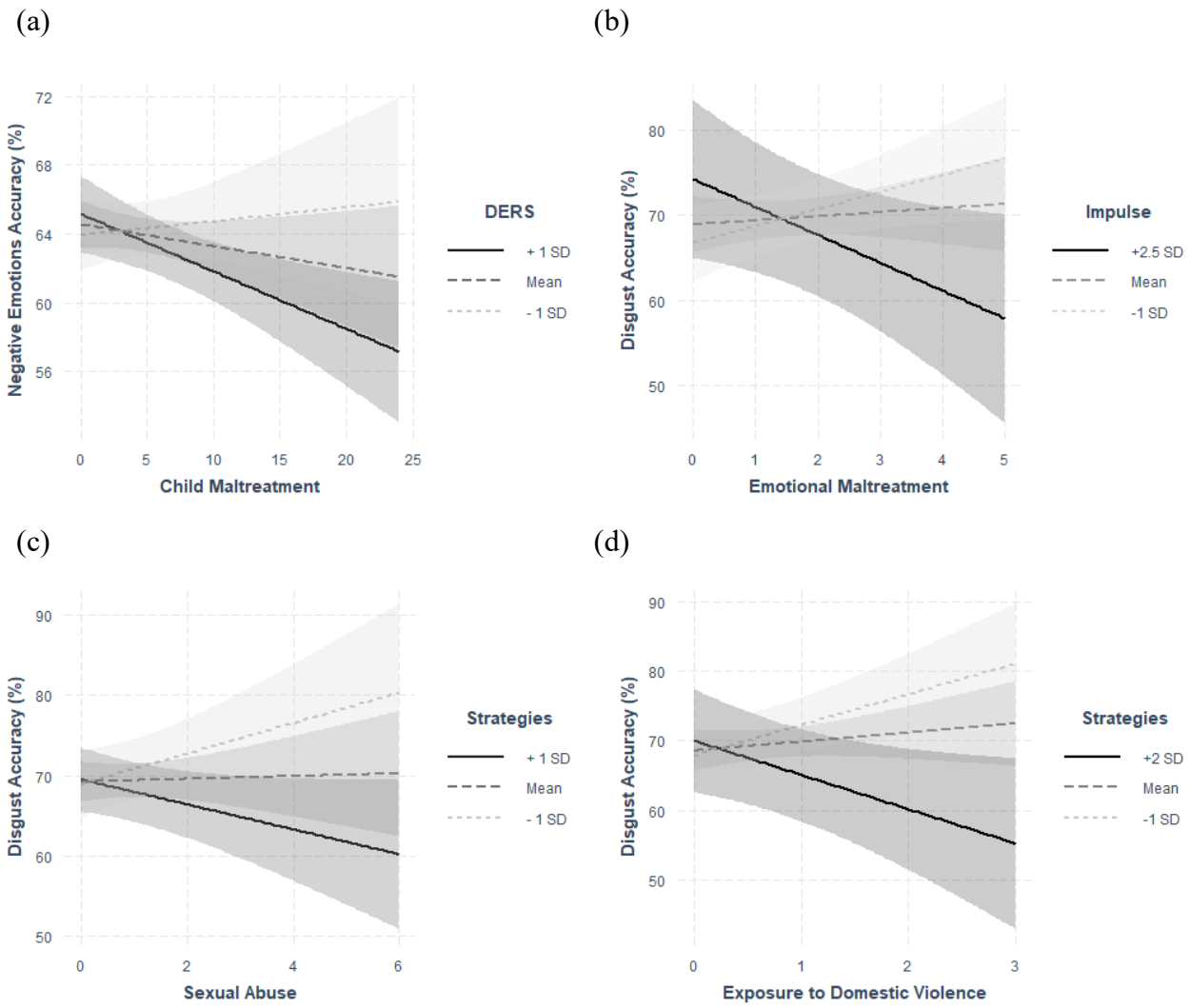
Table 5

Moderation analyses predicting accuracy rate in recognition of disgust by child maltreatment subtypes and strategies

	Model 1 Sexual abuse			***Model 2*** Emotional maltreatment			***Model 3*** Exposure to domestic violence		
	B	***SE***	***p***	***B***	***SE***	***p***	***B***	***SE***	***p***
Control Variables									
Gender	-5.61	3.49	.108	-5.48	3.50	.119	-5.36	3.49	.125
Ethnicity	-1.49	2.23	.503	-1.60	2.23	.475	-2.05	2.23	.359
Psychological distress	-0.04	0.08	.576	-0.03	0.08	.670	-0.04	0.08	.637
Child Maltreatment Variables									
Neglect	-1.57	1.20	.190	-1.51	1.20	.210	1.20	-0.07	.279
Physical abuse	-1.23	1.07	.251	-1.11	1.07	.301	1.08	-0.05	.455
Sexual abuse	0.17	0.75	.016	-0.32	0.74	.662	0.73	-0.02	.665
Emotional maltreatment	0.45	0.77	.556	0.58	0.77	.020	0.77	0.04	.589
Exposure to DV	1.40	1.30	.282	1.23	1.31	.346	1.30*	0.06	.002
Emotion Regulation Variables									
Clarity	-0.62	0.41	.127	-0.65	0.41	.112	0.41	-0.08	.181
Goals	0.22	0.39	.578	0.26	0.39	.502	0.39	0.04	. 495
Strategies	-0.41	0.47	.863	-0.36	0.48	.622	0.47	-0.08	.678
Impulse	-0.06	0.43	.891	-0.09	0.44	.842	0.43	-0.01	.892
Sexual abuse* Strategies	-0.52*	0.18	.004						
Emotional maltreatment* Strategies				-0.39	0.17	.020			
Exposure to DV* Strategies							0.30*	-0.16	.002
$\mathbf{R^2}$	.07			.06			.07		
$\boldsymbol{\Delta R^2}$	.02*			.013*			.022*		

Notes. Models 1 – 4 represent interactions between neglect, sexual abuse, emotional maltreatment, and exposure to DV, respectively, and strategies. Unstandardized estimates presented. Gender dummy coded female = 0; male = 1; ethnicity dummy coded white/Caucasian = 0; BIPOC = 1; DV = domestic violence; Clarity = lack of emotional clarity; Goals = difficulties engaging in goal-directed behaviour; Strategies = limited access to ER strategies; Impulse = difficulties with impulsivity. *Significance threshold determined as $p < .008$ after Benjamini-Hochberg correction.

Figure 1



(a) Negative emotion accuracy predicted by child maltreatment in interaction with difficulties with emotion regulation (DERS). Disgust accuracy predicted by (b) emotional maltreatment in interaction with difficulties with impulse control; (c) sexual abuse in interaction with limited access to emotion regulation strategies; and (d) exposure to domestic violence in interaction with limited access to emotion regulation strategies. Conditional effects were selected based on the Johnson-Neyman significance values. 95% CI given in the shaded areas.