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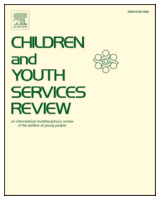

The role of emotion regulation strategies in the association between physical abuse and borderline symptoms among deprived youth in Ecuador

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ABSTRACT

Background: Childhood adversity is robustly associated with psychopathology, including borderline personality disorder. However, the underlying mechanisms by which these experiences increase risk for psychopathology are poorly understood. Modern theoretical models of childhood adversity suggest that violence exposure (e.g., physical abuse) impacts emotion regulation, while other experiences impact separate developmental outcomes such as executive function and language.

Objective: The present study tested whether physical abuse was associated with adaptive and non-adaptive emotion regulation strategies among adolescents living in foster care, and an aged-matched group living with their families. Further, it explored whether the association between physical abuse and borderline symptoms was explained by emotion regulation.

Participants and Setting: Adolescents living in foster care ($N = 44$) and a family-based group ($N = 128$) in Ecuador, a middle-income country with a high prevalence of physical abuse.

Methods: Adolescents reported on physical abuse and completed questionnaires to assess use of emotion regulation strategies, and borderline symptoms. Linear regressions and multi-group path analyses were conducted to test our hypotheses.

Results: Physical abuse was associated with greater use of self-blame, rumination, catastrophizing, and acceptance, and a positive indirect effect of physical abuse on borderline symptoms through catastrophizing was significant.

Conclusions: Results underscore the importance of physical abuse on specific emotion regulation strategies, replicating findings from Western, Educated, Industrialized, Rich and Democratic (WEIRD) samples. Moreover, they suggest the importance of studying these mechanisms as they relate to specific debilitating syndromes, such as borderline personality.

1. Introduction

1.1. Childhood adversity

Childhood adversity is common across the globe, with a prevalence of 38 % in middle and low income countries (Kessler et al., 2010). These include experiences of interpersonal violence such as physical abuse (Bernstein et al., 1994), which are strongly associated with increased risk for mental health disorders (Kessler, et al., 2010), such as borderline personality (Porter et al., 2020). Given the enduring impacts of childhood adversity, it is crucial to pinpoint the mechanisms that underlie these associations to provide more effective support for individuals who have experienced such challenges. However, the pathways through which childhood adversity leads to psychopathology remain inadequately understood (Heim et al., 2019; Herzog & Schmahl, 2018; Teicher & Samson, 2013).

Modern conceptualizations of childhood adversity suggest that the lack of understanding behind mechanistic pathways is due to traditional

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operationalizations of adversity (Belsky et al., 2012; McLaughlin & Sheridan, 2016). These frameworks suggest that even though experiences accumulate to predict negative outcomes (e.g., experiencing more adversity across domains leads to more psychopathology), specific experiences differentially predict developmental outcomes. Of particular interest, it is proposed that exposure interpersonal violence, but not neglect, is uniquely associated with deficits in emotion regulation (Sheridan & McLaughlin, 2014). The current study follows a modern conceptualization of childhood adversity to propose that experiences of abuse are associated with increased borderline symptoms through emotion regulation.

1.2. Emotion regulation

Emotion regulation is broadly defined as the set of processes involved in modulating the intensity, occurrence and expression of emotions (Thompson, 1994). Within the larger literature emotion regulation strategies can be categorized into multiple domains. For example, one framework proposes to separate emotion regulation strategies as automatic versus controlled and implicit versus explicit (Braunstein et al., 2017). As mentioned above, automatic strategies are considered those that do not involve intent or motivation, such as extinction learning (Gross, 2002), while controlled strategies require more conscious approaches, such as affective labeling. On the other hand, implicit strategies do not require a desire to change an emotional state, while explicit strategies involve actively pursuing an emotional shift (Braunstein et al., 2017). Here, we focus on explicit or effortful regulation, which we define as *intentional* and *motivated* strategies by which a person regulates their emotional experiences. Moreover, explicit regulation strategies can be further divided into adaptive vs non-adaptive. Adaptive strategies include those that are constructive and support emotional well-being, while non-adaptive often lead to increased distress or negative long-term consequences (Compas et al., 2001). Broadly, research shows that childhood adversity exposure is associated with non-adaptive explicit emotion regulation strategies such as disengagement, suppression, rumination, and avoidance, and less use of adaptive strategies such as reappraisal and refocusing (Amone-P'Olak et al., 2007; Boyes et al., 2016; Epstein-Ngo et al., 2013; Gruhn & Compas, 2020; Maughan & Cicchetti, 2002).

1.3. Childhood adversity, emotion regulation, and psychopathology

To date, most studies attempting to parse the differential effects of childhood adversity types on emotion regulation have focused on automatic regulation, finding that children with violence exposure, including physical abuse, are less effective at implicitly regulating their emotions (Kim et al., 2021; Lambert et al., 2017). However, one longitudinal study does suggest that, in adolescents, childhood abuse is associated with greater use of avoidance strategies, which in turn is associated with internalizing symptoms, such as anxiety and depression (Milojevich et al., 2019). In fact, neuroscientific evidence shows that childhood abuse is associated with greater recruitment of neural networks involved in salience detection and control during emotion regulation, suggesting that abuse facilitates threat detection, and that abused children require greater neural resources to control their negative experiences (Gruhn et al., 2024; McLaughlin et al., 2015; Weissman et al., 2022). Together, this evidence suggests that while abuse exposure is associated with automatic emotion regulation, more research is required to explore whether exposure to abuse predicts more explicit forms of emotion regulation.

Abuse is robustly associated with psychopathology, including fear and stress-related disorders (Busso, McLaughlin, Brueck, et al., 2017; Heleniak et al., 2016; Kim-Spoon et al., 2013; Naudé et al., 2022; Weissman et al., 2022). Additionally, research elucidating mechanisms by which abuse predicts psychopathology above other types of adversity has found associations with transdiagnostic psychopathology (Busso, McLaughlin, & Sheridan, 2017; Miller et al., 2018, 2021; Milojevich et al., 2019; Murgueitio et al., 2024, 2025; Schäfer et al., 2022). In several studies, these associations have been found to be mediated by emotional processes such as threat detection, and importantly, emotion regulation (Heleniak et al., 2016; Milojevich et al., 2019; Naudé et al., 2022; Weissman et al., 2022). In summary, this emerging body of research suggests not only that abuse is robustly associated with psychopathology risk, but that this association has specific mechanisms by which it emerges. However, these empirical studies have focused less on other type of debilitating syndromes, such as personality disorders.

1.4. Childhood Adversity, emotion Regulation, and borderline personality

Personality disorders are complex and challenging clinical syndromes characterized by problematic patterns of self-perception and relationships with others. Specifically, borderline personality disorder is characterized by emotion dysregulation, inappropriate anger, and fear of abandonment, among other symptoms (American Psychiatric Association, 2013; Zanarini & Frankenburg, 1997). In line with the childhood adversity literature, theories of the etiology of borderline personality propose that invalidating and traumatic childhood environments are strong contributors to its development (Zanarini & Frankenburg, 1997). In fact, a rich body of research links abuse to borderline symptoms (Bertele et al., 2022; Hatkevich et al., 2021; Porter et al., 2020; Rosenstein et al., 2018; Zanarini et al., 2011).

Consistently, theories on the etiology of borderline personality posit emotion dysregulation as a key mechanism of the disorder (Blatt & Levy, 2003; Bornovalova et al., 2006; Linehan, 1993; Scott et al., 2014). Because of the strong link between childhood adversity and emotion regulation (Amone-P'Olak et al., 2007; Boyes et al., 2016; Epstein-Ngo et al., 2013; Gruhn & Compas, 2020; Maughan & Cicchetti, 2002), several theories suggest that childhood adversity increases borderline personality risk and maintenance through deficits in emotion regulation (Annemiek Van et al., 2011; Van Dijke et al., 2013). In fact, several empirical studies have tested the link between maltreatment exposure and borderline symptoms (Bertele et al., 2022; Kuo et al., 2015; Rosenstein et al., 2018). Of particular interest, two separate studies, found that emotional abuse was associated with borderline features through difficulties in emotion regulation (Kuo et al., 2015; Rosenstein et al., 2018). Moreover, one study found that emotional lability mediated the association between childhood adversity and borderline personality diagnosis, suggesting that individuals with adversity exposure might have difficulties regulating their emotions as a result of the intensity and unpredictability of their negative emotional experiences (Edwards et al., 2021).

Similarly, research suggests that abuse exposure is associated with greater risk of suicidal thoughts and behaviors (Hennefield et al., 2019; Normand & Mishara, 1992), and it increases the likelihood of suicide attempts among youth (Miller et al., 2017; Ruch et al., 2021). Moreover, other studies have linked childhood abuse to suicidal thoughts and behaviors through emotion dysregulation (Andersson et al., 2022; Hatkevich et al., 2021), and while these behaviors are transdiagnostic (Schechter & Goldblatt, 2020), they are highly prevalent among patients with borderline personality disorder (Zanarini et al., 2011).

1.5. Summary

In summary, exposure to abuse is strongly associated with psychopathology through emotion dysregulation above and beyond other types of childhood adversities, such as neglect (Kim et al., 2021; Lambert et al., 2017; Milojevich et al., 2019). This promising body of research aims to elucidate the behavioral pathways by which adversity increases psychopathology risk (Belsky et al., 2012; McLaughlin & Sheridan, 2016). However, it has been mainly focused on studying automatic emotion regulation (Kim et al., 2021; Lambert et al., 2017), and transdiagnostic psychopathology (Busso, McLaughlin, & Sheridan, 2017;

Miller et al., 2018, 2021; Milojevich et al., 2019; Schäfer et al., 2022). On the other hand, a robust body of research links childhood adversities, particularly abuse, to borderline symptoms (Kuo et al., 2015; Rosenstein et al., 2018). Moreover, research suggests abuse exposure is associated with suicidal thoughts and behaviors through emotion regulation (Andersson et al., 2022; Hatkevich et al., 2021), and while this is a transdiagnostic factor of psychopathology (Schechter & Goldblatt, 2020), it is strongly present in borderline personality (Zanarini et al., 2011). However, it is unknown to what degree exposure to abuse is associated with borderline symptoms through deficits in effortful emotion regulation, above and beyond experiencing neglectful or depriving environments.

1.6. Current study

The current study sought to address this gap. We explore whether exposure to physical abuse was associated with adaptive and non-adaptive cognitive emotion regulation strategies in a sample of adolescents in foster care, as well as an age-matched family-based group (i.e., adolescents raised and living with their biological families). Additionally, we measured borderline symptoms, to explore links between physical abuse, emotion regulation, and borderline features.

We attempt to do this using a sample of foster-care raised adolescents living in a city in Ecuador, South America. Such samples are rarely included in research on childhood adversity and psychopathology, which is biased to studying samples from a small number of high-income countries, that is countries described as WEIRD (Henrich et al., 2010). We expected to replicate, in our non-WEIRD sample of foster-care and family-based adolescents, findings which show that across groups, physical abuse is associated with greater use of non-adaptive emotion regulation strategies, and lesser use of adaptive strategies. Moreover, we expected to find that these strategies explained the association between physical abuse and borderline symptoms across groups. In addition, we focus on both adaptive and non-adaptive emotion regulation strategies as both have been previously associated with abuse exposure and borderline symptoms (Hope et al., 2018; Khosravani et al., 2019; Krause-Utz et al., 2021; Rüfenacht et al., 2021).

We tested these hypotheses using a well-characterized sample of youth with a history of psychosocial deprivation: adolescents recruited from five different foster care sites located in Quito, Ecuador. While it has been shown that children in foster care are often exposed to abuse (Healey & Fisher, 2011), recent research suggests that, in comparison to global estimates, people from Ecuador report higher rates of physical abuse (47.6 % vs. 22.6 %), and that the most common perpetrators come from the family system (Jiménez-Borja et al., 2020). Thus, enriched samples such as ours that are highly exposed to interpersonal violence might be an ideal setting where the effects of physical abuse across foster care and family-based groups can be observed.

2. Method

2.1. Participants and Procedure

Participants were 202 adolescents living in Quito, Ecuador. Forty-four of them were recruited from five different group care homes around the city of Quito. The goal of the original study was to assess differences in emotion regulation and cognitive function between foster care youth and youth growing up with their biological families. Thus, the largest foster care sites and two large public schools in Quito were identified and recruitment was performed in those locations only.

All the care homes were regulated by governmental agencies, but were operated by non-governmental agencies (e.g., religious organizations). All provided group-based professional care (i.e., not within foster families). Two of the care homes accommodated only males, and the others were mixed sex. The adolescents were living in foster care for various complex reasons but being orphaned or abandoned by their parents were common features. All had been in foster care for a minimum of 12 months. None had been diagnosed with intellectual disability. The additional 133 participants were recruited from two separate public schools in the same city. For both samples, participants were excluded if they were not adolescents (i.e., 13–17 years old), and did not have data on at least one of the study key variables (i.e., emotion regulation questionnaire, physical abuse, personality questionnaire), making the analytical sample 172.

The research protocol was reviewed and approved by an appropriate research ethics committee. All parent or legal guardians signed the written informed consent, and participants provided written assent to participate. Participants were recruited in their foster homes or schools and data collection was conducted in the same place. All participants were assessed by research assistants under the supervision of a Ph.D. level psychologist. After parents or guardians had provided consent and participants assented, they completed the self-report questionnaires.

2.2. Measures

2.2.1. The cognitive emotion regulation questionnaire (CERQ)

The Cognitive Emotion Regulation Questionnaire (CERQ) assesses the use of cognitive emotion regulation strategies when people are under stress (Garnefski & Kraaij, 2007). It is composed of 36 items that can be divided into 9 different subscales of different cognitive emotion regulation strategies: a) self-blame, b) acceptance, c) rumination, d) positive refocusing, e) refocus on planning, f) positive reappraisal, g) putting into perspective h) catastrophizing, and i) other blame. In the CERQ, participants indicate the frequency of their use of strategies on a 6-point Likert-type scale ranging from 0 (*never)* to 5 (*always*).. Each subscale represents clinically and theoretically significant ways that people have been shown to cope with their emotions (Allan & Gilbert, 1995; Anderson et al., 1994; Carver et al., 1989; Endler & Parker, 1990; Folkman & Lazarus, 1988; Spirito et al., 1988; Sullivan et al., 1995; Tennen & Affleck, 1990). Higher scores in the self-blame scale represent higher use of blaming oneself as a mechanism (e.g., "*I feel I am the one to blame for it")*. The acceptance subscale is composed by questions that assess whether participants accept events/stressors have taken place (e.g., "*I think that I cannot change anything about it")*. Higher scores on the rumination scale are associated with repeatedly going over things that have happened and worrying about them (e.g., "*I am preoccupied with what I think and feel about what I have experienced*"). Higher scores of positive refocusing refers to shifting one's attention to positive matters (e.g., "*I think of something nice instead of what has happened*"). Refocus on planning explores acting to deal with the event (e.g., "*I think about how I can best cope with the situation*"). Positive reappraisal refers to reframing the situation within a positive light (e.g., "*I think that I can become a stronger person as a result of what has happened*"). Putting into perspective refers to reducing the negative intensity of the event by comparing it to other events (e.g., "*I think that other people go through much worse experiences*"). Catastrophizing refers to focusing on the negativity of the experiences and underscoring it (e.g., "*I often think that what I have experienced is much worse than what others have experienced*"). Finally, other blame refers to blaming others for what has happened (e.g., "*I think about the mistakes others have made in this matter*"). We used a validated Spanish-language version of the CERQ (Domínguez-Sánchez et al., 2013), which has also been validated for use with Spanish-speaking adolescents (Chamizo Nieto et al., 2020). In the present study the CERQ had a Cronbach's alpha of 0.88.

2.2.2. Self-Report of physical abuse

A questionnaire assessing a wide variety of exposures was administrated to the participants. In addition to demographic data, this questionnaire included items of alcohol and drug use, major physical illness, and involvement with the criminal justice system. An item asking participants whether they had been physically abused by their parents was also included. A binary variable (0 = Not Physically Abused, 1 =

Physically Abused) was computed.

Self-Report of Neglect.

Two items were scored as proxies for neglect. We asked participants whether they have ever lived in the streets alone, and whether one of their parents has been to jail. Across groups 10 participants reported having lived in the streets by themselves, and 27 having their parents go to jail. If participants reported either of these experiences, they were coded as "1″ in a binary variable of neglect.

2.2.3. Borderline symptoms

Participants completed the Patient Diagnostic Questionnaire – 4 (PDQ-4), a self-report assessment designed to assess personality disorders and other clinical symptoms (Hyler, 1994). The borderline personality subscale of the PDQ-4 is comprised of 9 items (true/false), and it is based on the diagnostic criteria for borderline personality listed in the DSM-IV. Items relevant to the borderline profile include questions that ask about their interpersonal relationships (e.g., "*I'll go to extremes to prevent those who I love from ever leaving me*"), black or white thinking (e.g., "*I either love someone or hate them, with nothing in between*"), self-injury (e.g., "*I have tried to hurt or kill myself*"), mood liability (e.g., "*I am a very moody person*"), and feelings of emptiness (e.g., "*I feel that my life is dull and meaningless*"). An adolescent adapted version of the scale in Spanish was used for the present study (Fonseca-Pedrero et al., 2013). Scores higher than 5 are indicative of borderline personality symptoms. For the current analysis, a continuous score was used as an outcome. In the present study the borderline scale had a Kuder-Richardson 20 of 0.88.

2.3. Data analysis

Ordinary least squares regressions were conducted to assess the association between physical abuse and the use of emotion regulation strategies. A separate model was conducted per emotion regulation strategy, with a total of 9 models being specified. Each model controlled for group (foster care or family-based), sex (Male or Female), age, and neglect. A multigroup path analysis (0 = foster care, 1 = family based) using the R package *lavaan* (Rosseel et al., 2017) was used to test: 1) the effects of physical abuse on emotion regulation strategies deemed significant using multiple regression (see results section; controlling for sex, and age), 2) the effects of those emotion regulation strategies on borderline symptoms (controlling for sex, and age), and 3) the indirect effects of physical abuse on borderline symptoms through emotion regulation strategies. Covariance between emotion regulation strategies was accounted within the model. Effects were estimated using bootstrapped standard errors (1,000 draws). We conducted a second multigroup path analysis to test the total effect of physical abuse on borderline symptoms through emotion regulation strategies that showed a significant indirect effect in our first path model. Confidence intervals were used to determine significance of direct, indirect, and total effects. Model fit was evaluated using Chi-square (χ^2) test, the root means square error of approximation (RMSEA), comparative fit index (CFI), Tucker-Lewis's index (TLI), and standardize root mean residual (SRMR). Good model fit was indicated by a non-significant χ^2, a RMSEA value of less than 0.06, CFI and TLI values greater than 0.95, and SRMR values of less than 0.08 (Bentler & Bonett, 1980; Hu & Bentler, 1999). We used maximum likelihood estimation (MLE) with robust standard errors to account for missing data (i.e., one participant had missing CERQ data). This approach considers the means, variances, and covariances of the existing data to calculate the estimates (Allison, 1987), as it has been found to produce less biased parameter estimates (Yilmaz, 2019). Finally, we conducted a series of post-hoc power analyses using the R package semPower (Moshagen & Bader, 2023), to test the adequacy of our sample size to detect model fit.

3. Results

3.1. Sample Description

Table 1 summarizes the characteristics of the sample. As for physical abuse, 80 participants reported having been abused by their parents, while 92 reported not having experienced physical abuse. Twenty one out of the 44 participants in the foster care group and 59 out of the 128 participants in the family-based group reported having experienced physical abuse. The mean age range of participants who reported being physically abused was 15.8 (SD = 1.2) vs. 15.3 (SD = 1.2) from those who reported not having such experiences. Additionally, Fig. 1 shows density plots of main study variables (i.e., emotion regulation strategies and borderline symptoms) by physical abuse group.

3.2. Physical abuse and foster care placement

A chi-square test of independence showed that there was no significant association between foster care placement and physical abuse (X^2 (1, N = 172) = 0.000, p = 0.99). Meaning that youth in the foster care group did not report being physically abused by their parents more than peers in the family-based group.

3.3. Bivariate correlations

Supplementary Table 1 shows bivariate correlations between the study variables. Borderline symptoms were associated with physical abuse ($r = 0.23, p < 0.01$), self-blame ($r = 0.25, p < 0.001$), rumination ($r = 0.24, p < 0.001$), and catastrophizing ($r = 0.43, p < 0.001$) across both groups (foster care and family-based groups). Being in foster care group was not associated with borderline symptoms ($r = 0.01, p > 0.05$).

3.4. Physical abuse and emotion regulation strategies

Controlling for group (foster care or family-based), sex, and age, physical abuse was positively associated with self-blame ($\beta = 0.39, p = .01$, 95 % CI = [.10, 0.68]), rumination ($\beta = 0.47, p < .001$, 95 % CI = [.18, 0.75]), catastrophizing ($\beta = 0.48, p < .001$, 95 % CI = [.17, 0.78]), and acceptance ($\beta = 0.45, p < .001$, 95 % CI = [.16, 0.75]). See Supplementary Table 2 for further details.

Table 1
Sample characteristics by exposure to physical abuse.

	Physical Abuse Yes (N = 80)		No (N = 92)	
	Mean (Standard Deviation)	Range	Mean (Standard Deviation)	Range
Age	15.8 (1.2)	13–17	15.3 (1.2)	13–17
Self-blame	11.6 (3.1)	4–19	11.6 (4.7)	4–18
Rumination	13.5 (4)	4–20	9.5 (3.5)	4–20
Catastrophizing	11.2 (3.7)	4–20	7.8 (3.4)	4–20
Other Blame	8.9 (13.9)	4–20	12.2 (3.5)	4–19
Acceptance	13.9 (3.4)	4–20	13.6 (3.9)	5–20
Positive Refocusing	13.2 (4.2)	4–20	14.9 (3.7)	4–20
Refocus on Planning	14.8 (3.6)	4–20	15.2 (3.7)	6–20
Positive Reappraisal	14.0 (3.8)	4–20	12.5 (3.9)	5–20
Putting into Perspective	13.2 (3.6)	4–20	15.3 (1.2)	4–20
Borderline symptoms	4.2 (3.3)	0–9	3.3 (1.7)	0–7
	%		%	
Sex (Male)	51.2		43.4	
Group (Foster Care)	26.2		25.0	

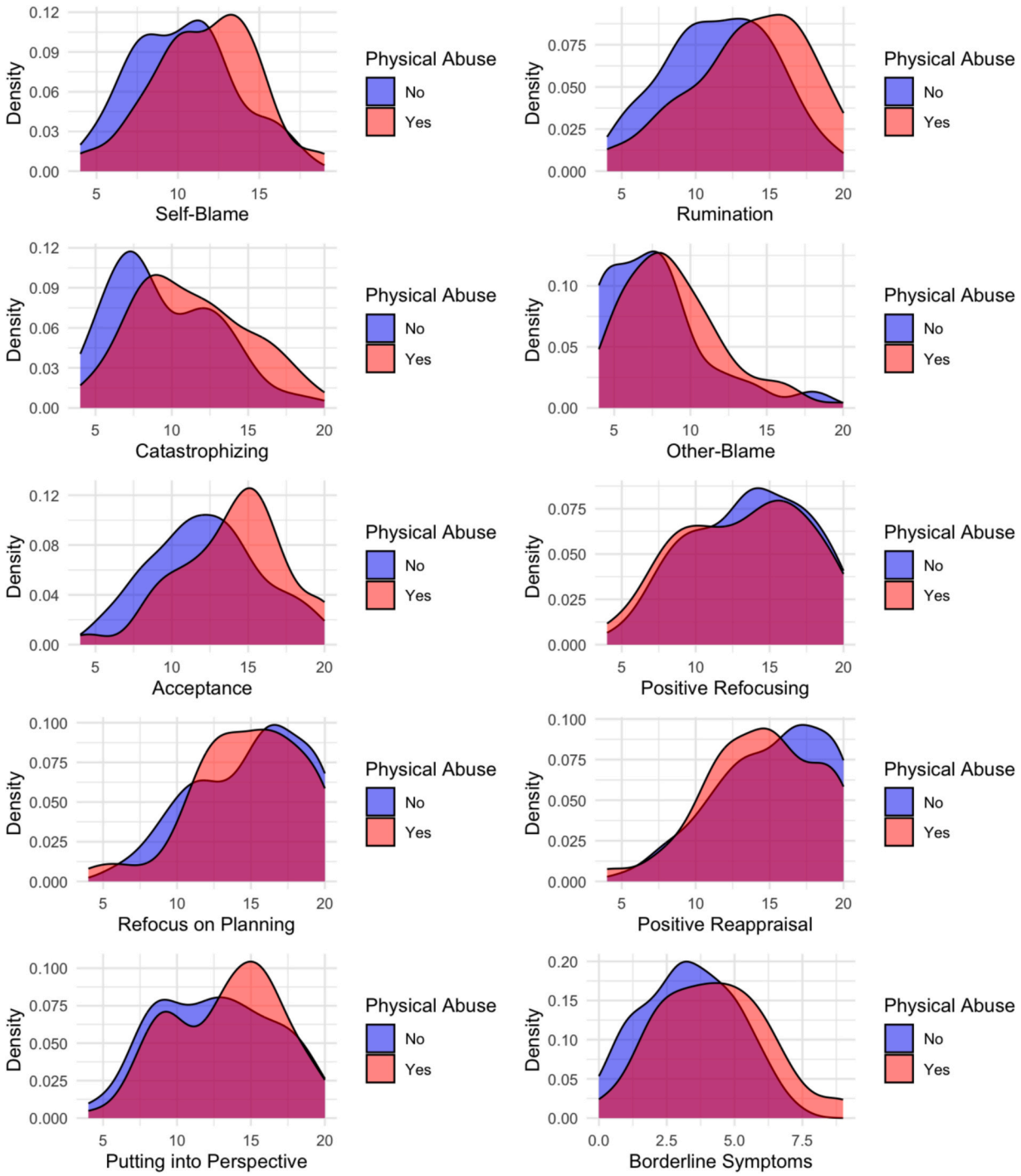

Fig. 1. Distribution of study main variables by physical abuse group.

3.5. *Multigroup path analysis to borderline symptoms*

Based on multiple linear regression models, self-blame, rumination, catastrophizing, and acceptance were selected as paths between physical abuse and borderline symptoms. Fig. 2 shows the results of the multigroup path analysis. Model fit was good (χ^2 (20, N = 172) = 23.15, p = 0.281; CFI = 0.98, TLI = 0.95; RMSEA = 0.05; SRMR = 0.04). Across groups (family based and foster care) physical abuse was associated with greater use of self-blame (family based: β = 0.39, 95 % CI = [.12, 0.68]; foster care: β = 0.39, 95 % CI = [.12, 0.68]), rumination (family based: β = 0.46, 95 % CI = [.16, 0.80]; foster care: β = 0.46, 95 % CI = [.16, 0.80]), catastrophizing (family based: β = 0.49, 95 % CI = [.19, 0.82]; foster care: β = 0.49, 95 % CI = [.19, 0.82]), and acceptance (family based: β = 0.37, 95 % CI = [.08, 0.69]; foster care: β = 0.37, 95 % CI = [.08, 0.69]). Additionally, and across groups (foster care and family-based), only catastrophizing predicted borderline symptoms (family based: β = 0.42, 95 % CI = [.25, 0.63]; foster care: β = 0.42, 95 % CI = [.25, 0.63]). Finally, there was a significant indirect effect of physical abuse on borderline symptoms through catastrophizing (β = 0.21, 95 % CI = [.07, 0.41]). No other indirect effects were significant (See Supplementary Table 3 for further details of this model). Even though there was a significant indirect effect across groups, when calculated separately only the family-based group showed a significant indirect effect of physical abuse on borderline symptoms through catastrophizing (β =

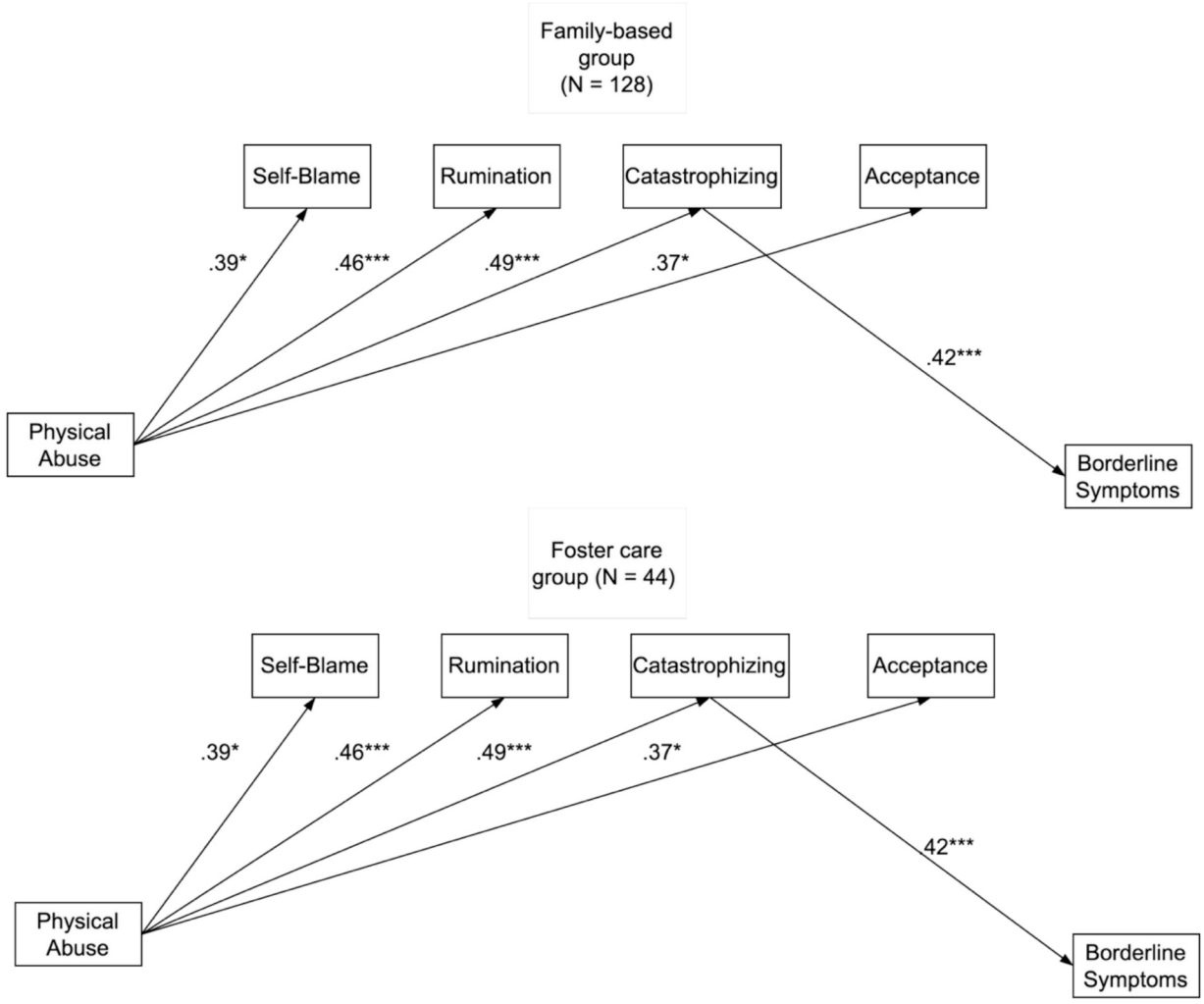

Fig. 2. Multigroup path model illustrating the effects of physical abuse on borderline symptoms through emotion regulation strategies. Physical abuse was indirectly associated with borderline symptoms through greater use of catastrophizing strategies. Single-headed arrows represent regression paths. Standardized parameter estimates (β) are presented for all significant paths (with bootstrapped confidence intervals using 1,000 iterations) using solid lines. *p < 0.05, **p < 0.01, ***p < 0.001.

0.18, 95 % CI = [-0.03, 0.37]), while the foster care group did not (β = 0.11, 95 % CI = [-0.33, 0.52]). We additionally conducted a model where the total effect of physical abuse on borderline symptoms through catastrophizing was included, model fit was good, (χ^2 (17, N = 172) = 19.19, p = 0.318; CFI = 0.99, TLI = 0.96; RMSEA = 0.03; SRMR = 0.04), however, the direct effect of physical abuse on borderline symptoms (β = 0.24, 95 % CI = [-0.06, 0.54]) and total effect through catastrophizing were not significant (β = 0.19, 95 % CI = [-0.12, 0.51]). See Supplementary Table 4 for further details of this model.

3.6. Post-hoc power analysis

We conducted a post-hoc power analysis to determine the adequacy of our sample size (N = 172) to accurately detect model fit or misfit. Our results showed that with a sample of 172 and expected RMSEA of 0.06 our power was 0.46. A second power analysis revealed that in order to achieve 0.80 power and detect a RMSEA value of 0.06 at the α = 0.05 level, we required a sample of at least 323 participants given our main study model.

4. Discussion

The present study examined whether emotion regulation strategies were associated with physical abuse, and the degree to which these strategies explained the association between abuse and borderline symptoms among foster care and family-based youth. Specifically, we observe that, across groups, youth exposed to physical abuse reported greater use of self-blame, catastrophizing, rumination, and acceptance as emotion regulation strategies. Further, greater use of catastrophizing was associated with more borderline symptoms and explained the association between physical abuse and borderline symptoms. These findings are consistent with modern conceptualizations of childhood adversity proposing that abuse exposure is associated with changes to emotion regulation ability above and beyond other co-occurring experiences (Sheridan & McLaughlin, 2014), and borderline personality etiology theories (Annemiek Van et al., 2011; Van Dijke et al., 2013).

4.1. Sample

Prior studies attempting to parse the distinct associations between adversity groups or types on behavior have been conducted exclusively in high income countries, with specific exceptions (Schäfer et al., 2020). The sample in the present study consisted of a highly deprived group (i.e., adolescents being raised in foster care because of serious childhood adversities), and a family-based group, both recruited from a non-WEIRD population (i.e., adolescents living in the capital city of a

South American Nation, Ecuador, a middle-income country). The current research contributes to the existing literature by addressing the WEIRD imbalance in research on emotion regulation and childhood adversity. However, it is worth noting that these results might not be generalized to other non-WEIRD countries, including those in Latin America. For example, a *meta*-analysis shows that the prevalence of abuse against children in Latin America is 58 % (Hillis et al., 2016), while recent reports suggest that the prevalence in Ecuador might be higher (Jiménez-Borja et al., 2020). Thus, one possibility is that our sample does not represent the lived experiences of people in other non-WEIRD societies, making our results more specific to the Ecuadorian context.

The adolescents in the foster care sample reported high levels of exposure to physical abuse, with almost half of all cases reporting physical abuse. This is consistent with other studies from Ecuador that have reported high-exposure to abuse in psychosocially deprived youth (Pluck et al., 2015). Nevertheless, in the present study, there were no differences in the self-report of physical abuse across foster care and family-based groups, meaning that, both deprived and non-deprived adolescents reported being physically abused. This might be due to the high prevalence of physical abuse in Ecuador (Jiménez-Borja et al., 2020), that does not seem to be influenced by sociodemographic factors (UNICEF, 2019). It is quite possible that as physical abuse of children is common within families in Ecuador, the foster care group had some protection from this due to their move into foster care. Because of this, we can observe associations between physical abuse, emotion regulation, and borderline symptoms. This highlights the importance of abuse in the mental health of both deprived and non-deprived youth.

4.2. Emotion regulation

Here we find that, across foster and family-based youth, exposure to physical abuse is associated with greater use of self-blame, rumination, catastrophizing, and acceptance, as emotion regulation strategies. This finding is consistent with the large childhood adversity literature showing that maltreatment is associated with negative coping (Amone-P'Olak et al., 2007; Boyes et al., 2016; Epstein-Ngo et al., 2013; M. A. Gruhn & Compas, 2020; Maughan & Cicchetti, 2002). Of particular importance, self-blame, rumination, and acceptance were all also associated with being in the foster care group. Only catastrophizing was uniquely associated with physical abuse, while not associated with group membership. Catastrophizing is a maladaptive regulatory strategy characterized by a magnification around the negative connotations of an experience (Sullivan et al., 2001). This negativity underscoring could be reflected in neuroimaging studies where abused youth show greater recruitment of salience network when processing negative stimuli (McLaughlin et al., 2015). Thus, specific areas of the brains of abused individuals focus on negative features of the environment, and this might translate into strategies that take advantage of that resource to attempt regulation.

Across studies, exposure to abuse has been associated with deficits in automatic emotion regulation (Kim et al., 2021; Lambert et al., 2017), however there is limited evidence across explicit emotion regulation strategies. One study found that abuse, but not neglect, was associated with greater use of avoidance as a coping strategy (Milojevich et al., 2019). Together, these results suggest that while abuse exposure might disrupt automatic regulatory processes, it might also disrupt effortful ones, in particular, those characterized with highlighting negativity and avoidant behavior (Patterson & McCubbin, 1987).

On the other hand, other types of explicit regulatory strategies might be influenced by both abuse and neglect. For example, in the present study we found that both being in the foster care group and being physically abused were associated with greater use of rumination. While rumination is strongly linked with psychopathology (McLaughlin & Nolen-Hoeksema, 2011), it involves various resources such as attentional processes, self-reference, and memory recall (Cooney et al., 2010). Its neurobiology involves several brain regions, including the temporal pole, which is involved in visual recognition, semantic representation, and language processing (Nejad et al., 2013; Northoff et al., 2006). This suggests that rumination involves processes and regions affected both by violent and impoverished environments (Sheridan & McLaughlin, 2014).

Interestingly, some emotion regulation strategies were not associated with exposure to physical abuse. For example, other-blame, an emotion regulation strategy in which individuals attribute guilt to other people for the situation experienced (Garnefski & Kraaij, 2007), was not associated with abuse or borderline symptoms. Other blame has been associated with externalizing psychopathology (Liu et al., 2024) and with expectations that other individuals meet high standards (Hewitt & Flett, 1991). It is possible that individuals with physical abuse exposure tend to engage in more internalizing strategies, such as self-blame and catastrophizing, instead. Moreover, other strategies not measured by the current study should be considered. For example, research suggests that suppression, the tendency to suppress one's emotional experiences, is positively associated with abuse exposure (Weissman et al., 2019). Moreover, studies suggest that individuals with high borderline symptoms tend engage in emotional suppression during high stress situations (Dixon-Gordon et al., 2018). Thus, emotional suppression might be an explicit emotion regulation strategy by which abuse exposure increases borderline risk, although this remains untested. Interestingly, emotional suppression has been associated with outcomes during psychotherapy, with patients experiencing high suppression having worse outcomes (Scherer et al., 2017). Thus, emotional suppression might be a relevant marker of treatment outcomes among those with abuse exposure and borderline symptomatology.

4.3. Pathways to borderline symptoms

Greater use of catastrophizing explained the association between physical abuse and borderline symptoms. These findings are consistent with previous studies finding associations between abuse and psychopathology mediated by emotion regulation (Milojevich et al., 2019), and studies linking abuse to borderline symptoms through the same mechanism (Kuo et al., 2015; Rosenstein et al., 2018). However, it is the first study to test the link between physical abuse and borderline symptoms across foster care and family-based groups. Together, these results suggest that studying childhood adversity from a dimensional perspective can be useful not only for clusters of symptoms (Heleniak et al., 2016; Milojevich et al., 2019; Naudé et al., 2022; Weissman et al., 2022), but, also, for chronic syndromes, such as borderline personality. Additionally, these results parallel those in the suicide literature, showing that exposure to interpersonal violence is associated with greater suicidal tendencies (Hennefield et al., 2019; Miller et al., 2017; Normand & Mishara, 1992; Ruch et al., 2021), and this effect is mediated by emotion dysregulation (Andersson et al., 2022; Hatkevich et al., 2021). Future studies should aim to parcellate whether suicidal behaviors are uniquely affected by interpersonal violence within borderline personality.

4.4. Strengths and limitations

The present study is not without limitations. First, the cross-sectional nature of the study does not allow us to imply directionality of the associations between abuse, emotion regulation, and borderline symptoms (Pearl, 2010). Meaning that, even though the theoretical model implies that physical abuse impacts emotion regulation, and in turn this increases borderline symptoms, our current analyses cannot state that emotion regulation predates borderline symptoms. It might be that youth with borderline symptoms have poor emotion regulation as a consequence of their debilitating symptomatology. Indeed, emotion dysregulation is a core feature of borderline personality disorder (Blatt & Levy, 2003; Bornovalova et al., 2006; Linehan, 1993; Scott et al., 2014), thus, it's possible that the results reflect such reality and not a

mechanistic pathway as proposed by our theoretical model. Future studies should aim to explore the associations suggested in the current study using longitudinal data that spans childhood and adolescence. Second, even though our comparison across foster care vs. family-based youth allows us to an extent to imply depriving experiences, we only had a proxy of neglect, but did not measure or ask participants about this type of exposure. Third, we measured physical abuse through self-report and using a binary variable, which could obscure heterogeneity in abuse exposure (Milojevich et al., 2019). Thus, we lack an understanding on whether the presence of abuse is associated with emotion regulation and borderline symptoms, or alternatively it is the accumulation of such experiences that is most relevant. Importantly, future studies should use both subjective and objective measures physical abuse to determine whether these effects differ by reporter type. For example, prior large-scale studies suggest that subjective measures of childhood adversity are better predictors of psychopathology outcomes than objective reports (Danese & Widom, 2020, 2023), suggesting that an individual's appraisal of their childhood experiences plays a key role in their current well-being. Moreover, future studies should integrate standardized tools or official records to refine exposure dimensions. Similarly, our proxy of neglect conflates various forms of childhood adversity including family disruption and economic deprivation. These proxies fail to distinguish specific types of neglect (e.g., emotional vs. physical), potentially leading to attribution bias in effects. In line with this limitation, our measurement of emotion regulation was also via self-report. While several studies have measured emotion regulation through self-report, there are inconsistencies on how these measures operationalize this construct. Hence, the present results might be comparable to other studies that measured the same emotion regulation strategies, for example, studies using the CERQ. Fourth, we were unable to control for other risk factors that have been robustly associated with both emotion regulation and psychiatric risk, such as the prenatal environment (Godfrey & Barker, 2001), or childhood unpredictability (Glynn et al., 2019). Finally, the sample size of our current analysis ($N = 172$) is a key limitation. Indeed, post-hoc power analyses demonstrated that our current sample size was underpowered to detect moderate levels of model fit, and the good statistical fit observed in our path analyses should be interpret with caution. Thus, future studies with similar methodological designs should aim to include larger sample sizes.

Despite these limitations this study has several strengths. One of the main strengths in the present study is the ability to compare the effects of physical abuse on behavior across foster care and family-based youth. In addition, this is the first study to attempt to show unique associations between physical abuse and borderline symptoms, above and beyond depriving environments. While other studies have done so with other psychopathologies (Miller et al., 2018; Milojevich et al., 2019), none have done it with borderline personality, which is a prevalent and debilitating syndrome (American Psychiatric Association, 2013; Zanarini & Frankenburg, 1997). Moreover, this study was conducted in Ecuador, a middle-income country with high rates of child physical abuse (Jiménez-Borja et al., 2020). Showing that dimensional conceptualizations of childhood adversity might be applicable across the globe (Schäfer et al., 2020), and not only in high-income countries where most of the research is conducted.

4.5. Implications

The present study also has several implications that may warrant consideration in the detection and prevention efforts designed to address childhood adversity concerns across the globe. For example, our findings indicated that individuals who experienced physical abuse exhibited greater catastrophizing and borderline symptoms. This growing evidence stresses the necessity of teaching adaptive emotion regulation strategies to populations with violence exposure (McLaughlin et al., 2020). For example, trauma-focused cognitive behavioral therapy teaches individuals to regulate their emotions by reframing the meaning of events (Dorsey et al., 2017). This type of intervention could be particularly helpful for individuals with abuse exposure, across high and low-risk groups, and various geographies (e.g., high, and middle-income countries).

Other treatments could also help youth exposed to abuse decrease the risk for borderline symptoms. For example, therapies targeting inhibitory learning could help individuals reduced their feelings of fear towards specific stimuli, and thus reducing the need to utilize both adaptive or non-adaptive emotion regulation strategies (Craske et al., 2014). Moreover, in line with our findings around catastrophizing, interventions targeting attentional biases towards negativity could help individuals avoid the use of non-adaptive emotion regulation strategies that intensify, rather than reduce, their emotional distress (Waters & Craske, 2016). Finally, interventions underscoring and maximizing approach towards positive experiences might help youth naturally regulate their feelings of negativity and distress (Craske et al., 2016). Despite these implications, the PDQ-4 indicates clinical impairment when scores are equal or greater than 5, but the current sample means (4.2 and 3.3) suggest subclinical levels of symptomatology, thus, these results cannot be generalized to clinical populations.

5. Conclusion

In summary, this study documents that adolescents exposed to physical abuse reported greater use of non-adaptive emotion regulation strategies. Additionally, the association between physical abuse and borderline symptoms was explained by catastrophizing as an emotion regulation strategy. We provide evidence of these associations using a sample of youth growing up in foster care and a sample of youth raised by their biological families in Ecuador. These findings highlight the importance of studying emotion regulation in high-risk populations as they are associated to specific debilitating syndromes, such as borderline personality.

Ethical standards statement: All stages of the current study were approved by the Institutional Review Board of Universidad San Francisco de Quito (USFQ).

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Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.childyouth.2025.108430.

Data availability

The data that has been used is confidential.

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