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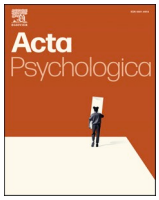

# Exploring the links between childhood emotional abuse and empathy: The mediating roles of alexithymia and sensory processing sensitivity

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ABSTRACT

*Background:* Exposure to childhood emotional abuse amplifies the personality traits of alexithymia and sensory processing sensitivity (SPS) and impacts empathy.
*Objective:* This study investigated if alexithymia, SPS positive traits, and/or SPS negative traits mediate the relationship between childhood emotional abuse and both emotional contagion measured behaviourally and self-reported empathy.
*Materials and methods:* A sample of 190 university students ($M_{age}$ = 19.92 years) completed self-report measures of empathy and a behavioural task measuring emotional contagion elicited by viewing affective films. Multiple parallel mediation analyses were run to determine if the personality variables mediated the links between abuse and empathy-related outcome measures.
*Results:* The relationship between childhood emotional abuse and each of the self-report empathy subscales was mediated by personality, although the strength and direction of the effects varied across the three trait clusters. In the behavioural task, aspects of SPS mediated the relationships between emotional abuse and the strength of the primary emotion felt during viewing of positive and negative films; and alexithymia mediated the relationship between emotional abuse and the number of discrete emotions felt during viewing of negative films.
*Conclusions:* The findings provide important insights into how childhood exposure to emotional abuse can impact personality development and, indirectly, the development of empathy. They also highlight the importance of considering the relative strength of specific traits associated with both alexithymia and SPS when trying to predict individual differences in empathy. The results may inform the development of individualized intervention programs targeting empathic deficits.

## 1. Introduction

Childhood emotional abuse involves repeated patterns of caregiver behaviour directed toward a child that negatively impact the child's self-worth, make the child feel flawed or unloved, and/or humiliate and demean the child (Bernstein et al., 2003; Chamberland et al., 2011). In their review of meta-analytic studies, Stoltenborgh et al. (2015) found that prevalence estimates for this type of abuse were similar across continents and fell at 36.3 % globally, based on self-report data. This raises serious concerns, as the experience of such abuse has been associated with negative outcomes in adulthood, including an increased risk for depression and anxiety (Van Landeghem & Jakobson, 2024), poor self-esteem, maladaptive substance use, and interpersonal difficulties (Chamberland et al., 2011).

One interpersonal domain that may be impacted by childhood emotional abuse is empathy. This is a multidimensional construct, underpinned by emotional contagion (Prochazkova & Kret, 2017). We use the term *empathy* here to refer to a range of processes, including not only the ability to identify and feel the same emotion as another person, but to feel a related emotion (such as sympathy or concern) that is appropriate to the situation (Håkansson Eklund & Summer Meranius, 2021). Findings from a recent meta-analysis suggest that the experience of emotional abuse in childhood is related to a reduced ability to identify another's emotions (Zhang et al., 2024) and an increased tendency to experience personal distress when confronted with tense or uncomfortable interpersonal situations (Benz et al., 2023). These outcomes could negatively impact one's ability to empathize with and act compassionately toward others (Jordan et al., 2016).

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A variety of factors could account for the association between childhood emotional abuse and empathy. In this paper, we test the novel proposal that early experiences of emotional abuse shape the development or expression of certain personality traits characterized by atypicalities in emotional awareness and emotion regulation, and that these traits, in turn, impact empathic processes. The work was inspired by a model proposed by Smith et al. (2018) that was developed to explain how emotional experiences unfold and reach awareness. This model acknowledges the important, and interacting, roles that both cognitive habits (which are shaped by life experiences) and personality traits with an innate component play in emotional awareness. The two personality traits we focused on were alexithymia and sensory processing sensitivity (SPS). As described below, expression of these frequently co-occurring traits has been shown to be impacted by exposure to early adversity and to contribute to individual differences in empathy.

Alexithymia is a trait characterized by difficulties identifying and describing one's own emotions, and by an externally oriented thinking style (Bagby et al., 1994; Preece & Gross, 2023; Sifneos, 1973). Exposure to childhood abuse or maltreatment is associated with stronger expression of alexithymia, potentially (in part) because emotionally abusive parents fail to provide proper modeling and reinforcement of emotion expression and regulation (Ditzer et al., 2023; Khan & Jaffee, 2022). This could impact a child's ability to develop healthy emotion processing. Alexithymia is associated with weaknesses in other-oriented empathy processes such as perspective taking and empathic concern, and with experiencing greater personal distress when in tense interpersonal situations (e.g., Di Tella et al., 2020; McQuarrie et al., 2023). As such, it may be that alexithymia helps to explain the deficits in these processes that are seen in those who were emotionally abused in childhood.

SPS is associated with increased sensitivity to one's environment, a tendency to engage in “deep” processing (i.e., encoding and processing information in a meaningful and elaborate way; Craik & Lockhart, 1972), strong fantasizing tendencies, and heightened emotional reactivity (Aron et al., 2012; Aron & Aron, 1997). Recent work has shown that these and other features of SPS can be grouped into two broad clusters (Attary & Ghazizadeh, 2021; De Gucht et al., 2022; Jakobson et al., 2024). Positive aspects of SPS include sensitivity to subtle internal, external, and interpersonal stimuli, sensitivity to pleasurable forms of stimulation (sensory comfort), and heightened appreciation of environmental aesthetics, art, and music (i.e., aesthetic sensitivity). Negative aspects of SPS include strong emotional and physiological reactivity and sensitivity to sensory discomfort (De Gucht et al., 2022). Strong expression of the negative features, in particular, may place highly sensitive individuals who were exposed to early adversity at an increased risk for developing internalizing symptoms or psychopathology (Aron et al., 2005, 2012; Karaca Dinç et al., 2021; Lionetti et al., 2024). Both aspects of SPS may also shape the development of empathic tendencies. Indeed, SPS has been found to predict both “self-oriented” processes (awareness of feelings of personal distress and of the fact that one's feelings or actions mirror those of another) and “other-oriented” processes (empathic concern and perspective taking) related to empathy (McQuarrie et al., 2023; Schaefer et al., 2022). Given this, it seems possible that SPS could also help explain the relationship between childhood emotional abuse and empathy.

When studying alexithymia or SPS, it is important to note that these traits frequently co-occur (Jakobson et al., 2024; Van Landeghem & Jakobson, 2024), with alexithymia showing the strongest relationship to the SPS negative trait cluster (Attary & Ghazizadeh, 2021). Individual differences in the relative strength of these personality variables appear to contribute to individual differences in one's sensory processing style (Jakobson & Rigby, 2021) and cognitive style (Jakobson et al., 2024). Given this and the relationships each trait has with both childhood abuse and empathy, it is important to tease apart the unique roles that each might play in mediating the relationship between the experience of childhood emotional abuse and levels of empathy assessed in adulthood—yet this is seldom done. Instead, most researchers study alexithymia *or* SPS without considering the overlap, thereby introducing a confound. For this reason, in the current study we treated alexithymia, SPS positive traits, and SPS negative traits as parallel mediators. Our empathy-related outcomes were measured through both self-report and behavioural testing. The self-report measure utilized in this study included subscales measuring perspective-taking, empathic concern, the tendency to identify with fictional characters, personal distress, and awareness of both emotional and behavioural contagion (Davis, 1983; Jordan et al., 2016). The behavioural task involved measurement of emotional contagion elicited by viewing affective film clips. Emotional contagion is considered to be a building block of empathy (Prochazkova & Kret, 2017). It arises from automatic motor and physiological mimicry of other people, and awareness of it supports the feeling that one is sharing another's emotional state (Hatfield et al., 1993).

Based on the research described above, the present study was designed to use mediation analysis to test a proposed causal pathway linking our study variables. Our design also allowed us to control for overlap between different facets of SPS and alexithymia, and to tease apart the unique contributions each makes to the prediction of empathic processes. We expected that self-reported exposure to childhood emotional abuse would predict stronger expression of alexithymia and of both the positive and negative facets of SPS in adults. Higher levels of alexithymia were then hypothesized to predict lower levels of perspective taking, empathic concern and contagion, and stronger feelings of distress in tense interpersonal situations, and to impact participants' emotional response to affective film clips. Higher levels of SPS were expected to predict higher levels of empathy and stronger emotional contagion elicited by viewing affective film clips; however, whether the positive or negative facets would prove to be equally strong predictors of the various outcomes was unclear.

## 2. Materials and methods

### 2.1. Participants

Participants were a convenience sample of adult university students enrolled in an Introduction to Psychology course. To minimize cultural influences or language barriers, participation was restricted to Canadian citizens and those with English as a first language. Exclusion criteria included having a self-reported history of neurological disorder or significant head injury. Participants received credit toward a research participation option for taking part in the study. After data cleaning (see the Analyses section, below), the final sample included 190 participants (51.0 % female), with a mean age of 19.9 years ($SD$ = 4.7). This exceeded the sample size needed to detect a medium effect with power of 0.80 and an alpha of 0.05, as determined a priori using G*Power 3.1 (Faul et al., 2009). All participants provided informed consent prior to participation.

### 2.2. General procedure

The data for this study were collected online using the Qualtrics survey platform. Participants answered questions regarding demographic variables (age, sex, and gender) and completed self-report measures of childhood emotional abuse, alexithymia, SPS, and empathy, along with several other measures used in a separate investigation. Participants also completed a behavioural task assessing emotional contagion. Although the methods described bear some similarity to those in other published reports, there were important differences which we have outlined in the Supplementary Materials. Ethical approval was granted by the university research ethics board (protocol number HE2022–0210, approval granted November 2022).

### 2.3. Measures

#### 2.3.1. Emotional contagion behavioural task

Film clips for the behavioural task were compiled from affective film libraries created by Maffei and Angrilli (2019) and Samson et al. (2016) (see supplementary materials, Table S1, for a list of the film clips). Participants watched 12 positive, 12 negative, 12 mixed-valence, and 12 neutral clips, presented in a random order. Each clip was approximately eight seconds in length and played without audio. After viewing each clip, participants rated how strongly they personally felt the emotions of amusement, repulsion, fear, boredom, and embarrassment. These ratings were made using a five-point Likert scale ranging from 1 (*do not agree at all*) to 5 (*strongly agree*).

#### 2.3.2. Emotional Abuse Subscale of the Childhood Trauma Questionnaire–Short Form

The Emotional Abuse subscale of the Childhood Trauma Questionnaire–Short Form (eaCTQ; Bernstein et al., 2003) measures the level of emotional abuse experienced in childhood. Five items are rated on a five-option Likert scale ranging from 1 (*never true*) to 5 (*very often true*). After reverse-scoring appropriate items, a sum is calculated to create a total score. The reliability of this subscale in the present sample was good ($\alpha = 0.85$).

#### 2.3.3. Toronto Alexithymia Scale

The Toronto Alexithymia Scale (TAS-20) measures three main facets of alexithymia: difficulties identifying feelings, difficulties describing feelings, and externally oriented thinking (Bagby et al., 1994). The twenty items are rated on a five-option Likert scale ranging from 1 (*strongly disagree*) to 5 (*strongly agree*). After reverse-scoring where indicated, ratings are summed to produce a total score that can range from 20 to 100. The reliability of the TAS-20 total score in the current study was good ($\alpha = 0.82$).

#### 2.3.4. Sensory processing sensitivity

SPS is commonly measured using the Highly Sensitive Person Scale (HSPS; Aron & Aron, 1997); however, Aron et al. (2012) recommend supplementing the HSPS with the Orienting Sensitivity subscale of the Adult Temperament Questionnaire (OS; Evans & Rothbart, 2007) to capture the features of SPS more fully. This approach was followed in the present study. The HSPS includes three subscales that measure the tendency to become overwhelmed by busy sensory environments and multi-tasking demands (Ease of Excitation), sensitivity to unpleasant stimulation (Low Sensory Threshold), and sensitivity to subtle, aesthetic qualities of one's environment (Aesthetic Sensitivity) (see Smolewska et al., 2006). The 27 items that comprise this scale are rated on a seven-option Likert scale ranging from 1 (*not at all*) to 7 (*extremely*). The subscales of the OS measure awareness of subtle environmental cues (Neutral Perceptual Sensitivity) and of emotional responses to subtle, non-social stimuli (Affective Perceptual Sensitivity), along with tendencies to engage in cognitive processes such as imagery that are not driven by sensory stimulation (Associative Sensitivity). The OS has 15 items, which are rated on a seven-point Likert scale ranging from 1 (*extremely untrue*) to 7 (*extremely true*).

We have recently shown that the Aesthetic Sensitivity subscale of the HSPS and the three subscales of the OS load onto one factor, and that the Low Sensory Threshold and Ease of Excitation subscales of the HSPS load onto another (Jakobson et al., 2024). Following De Gucht et al. (2022) and Attary and Ghazizadeh (2021), we referred to the former factor as capturing an SPS positive trait cluster, and the latter as capturing an SPS negative trait cluster. In the current study, the mean of the Aesthetic Sensitivity subscale of the HSPS and the three subscales of the OS was calculated to produce a composite "SPS Positive" score and the mean of the Low Sensory Threshold and Ease of Excitation subscales of the HSPS was calculated to produce a composite "SPS Negative" score. In our sample, the reliability of both the SPS Positive ($\alpha = 0.84$) and SPS Negative ($\alpha = 0.90$) composite scores was good.

#### 2.3.5. Interpersonal Reactivity Index and Empathy Index

The Interpersonal Reactivity Index (IRI; Davis, 1983) and Empathy Index (Jordan et al., 2016) were combined into a 42-item measure of empathy and related constructs (the IRI/EI). The IRI includes four subscales: perspective-taking (PT), measuring the ability to adopt the point of view of another; empathic concern (EC), measuring the ability to feel concern for another in need; fantasy (FS), measuring the tendency to imagine scenarios described in narrative works and how the characters might feel; and personal distress (PD), measuring the tendency to feel uncomfortable in tense interpersonal situations. The EI adds two subscales: empathy (EMP), measuring awareness of emotional contagion (i.e., the mirroring of another's emotional state); and behavioural contagion (BC), measuring awareness that one is mimicking the behaviours or actions of another. Each item is rated on a five-option Likert scale from 0 (*does not describe me well*) to 4 (*describes me very well*). Each subscale includes seven items and the ratings are summed. Five of the subscales showed adequate reliability in the current sample ($\alpha \geq 0.68$). The exception was the BC subscale, which had a reliability coefficient of $\alpha = 0.62$. Because the reliability of this subscale was questionable (George & Mallery, 2003), it was not included in the analyses.

### 2.4. Analyses

Prior to analysis, the data were cleaned. If a given individual completed the study more than once, only the first set of responses was retained. The remaining data were checked to ensure that participants had completed all subscales of a given measure and that proper reverse-scoring and coding had been applied. The data were also checked for outliers and possible violations of normality. After confirming that missing data were missing completely at random, missing values were imputed using an Estimation-Maximization algorithm. Linearity between the independent and dependent variables was confirmed. Statistical analyses were conducted using IBM SPSS Statistics for Microsoft, Version 28.

Two measures were extracted for each participant from the ratings collected in the behavioural task. First, we computed the mean rating for each emotion, for each film type. These mean ratings were subsequently entered into a repeated measures analysis of variance (ANOVA) that allowed us to identify the strongest or "primary" emotion(s) elicited by each film type in the sample as a whole. Second, we computed a "dispersion" score for each film type by finding the average number of emotions that received a rating greater than one. These scores could range from zero to five and provided a measure of the purity of the emotional response to each type of film. A repeated measures ANOVA was also run with the dispersion score for each film type to determine if these scores differed significantly across film types.

Multiple parallel mediation analyses were run using model 4 in the PROCESS macro (Hayes, 2022) to determine if links between childhood emotional abuse and any of the outcome measures (i.e., the strength of the primary emotions and the number of discrete emotions elicited by each type of film used in the behavioural task, and scores on the subscales of the IRI/EI) were mediated by the personality variables. For each mediation analysis, percentile bootstrap confidence intervals were calculated using 5000 bootstrapped samples. Following contemporary thinking regarding mediation analyses (Hayes, 2022), we did not consider establishing a simple association between our predictor and outcome variables a precondition for testing mediation.

## 3. Results

### 3.1. Emotional contagion profiles

A 4 (Film Type) X 5 (Emotion) repeated measures ANOVA conducted on mean emotion ratings produced main effects of film type, $F_{(2.26,}$

$_{427.18)} = 222.78$, $p < .001$, $\eta_p^2 = 0.54$, and emotion, $F_{(2.51,\ 475.15)} = 156.47$, $p < .001$, $\eta_p^2 = 0.45$, but it also produced a significant interaction between these variables, $F_{(4.30,\ 811.74)} = 539.98$, $p < .001$, $\eta_p^2 = 0.74$ (see Fig. 1). Planned tests of the simple main effect of emotion confirmed that the primary emotions elicited by the positive, negative, and neutral films were amusement, fear, and boredom, respectively. In the case of mixed valence films, amusement and embarrassment were the two most strongly endorsed emotions. As such, the mean of these ratings served as an index of the strength of the primary emotion blend elicited by these films. These results were expected based on film content and support the view that, rather than experiencing non-specific increases in arousal, viewers experienced emotional contagion from cues produced by the characters in the films.

The repeated measures ANOVA comparing dispersion scores produced a significant main effect of film type, $F_{(2.54,\ 479.03)} = 319.99$, $p < .001$, $\eta_p^2 = 0.63$. Pairwise comparisons indicated that the dispersion scores across the four film types differed significantly from one another. As shown in Table 1, Mixed films produced the greatest amount of dispersion in emotion ratings, followed by Negative and Positive film types, and finally Neutral films.

### 3.2. Descriptive statistics and zero-order correlations

Descriptive statistics for all study variables are presented in Table 1. Using cut-off scores identified by Bernstein and Fink (1998), 53.2 % of participants had experienced none-to-minimal emotional abuse, 20.0 % had experienced low-to-moderate levels of abuse, 12.1 % had experienced moderate-to-severe levels of abuse, and 14.7 % had experienced severe-to-extreme levels of emotional abuse.

Zero-order correlations between all study variables are shown in Supplementary Table S2. To reduce the risk of Type 1 errors when testing multiple correlations, the Benjamini-Hochberg procedure was used with a False Discovery Rate of 0.05; this procedure was chosen as it is less conservative than the Bonferroni correction, therefore allowing for improved power. Generally speaking: (a) the behavioural measures were more strongly correlated with one another than with the self-report measures, and vice versa; (b) fear elicited by negative films was the behavioural variable most strongly linked to SPS and to IRI/EI scores; (c) boredom elicited by neutral films was the behavioural variable least strongly linked to SPS and to IRI/EI scores; and (d) exposure to emotional abuse in childhood was most strongly related to alexithymia, SPS, FS, and PD scores, although all of these effect sizes were small.

### 3.3. Mediation analyses

To determine whether the personality variables mediated links between childhood emotional abuse and empathic processes, we ran two sets of mediation analyses. The general form of the mediation analyses is illustrated in Fig. 2. The first set of two planned analyses included the primary emotion and the dispersion scores elicited by different types of films as the outcome variables. The second set of five planned analyses included the IRI/EI subscales as the outcome variables. Note that paths from the predictor to the personality traits that served as mediators were common to all models tested. As expected, greater exposure to emotional abuse in childhood predicted higher TAS-20 ($a_1$: $b = 0.61$, $p < .001$), SPS Positive ($a_2$: $b = 0.03$, $p < .01$), and SPS Negative ($a_3$: $b = 0.04$, $p < .05$) scores.

Table 2 shows the unstandardized coefficients in the models predicting behavioural measures in which mediation was supported. SPS Positive scores fully mediated the link between eaCTQ scores and amusement elicited by positive films. SPS Negative scores fully mediated the link between eaCTQ scores and fear elicited by negative films. Finally, alexithymia emerged as a significant mediator of the link between eaCTQ scores and dispersion scores for the negative films.

Table 3 shows the unstandardized coefficients in the models predicting IRI/EI scores. Based on measured direct and indirect effects, full mediation via at least two of the mediators was supported in each model tested. Higher TAS-20 scores predicted lower self-rated EC and PT, and stronger ratings of PD, but were unrelated to scores on the FS and EMP subscales. Stronger expression of SPS Positive traits predicted higher self-ratings of EC, PT, FS, and EMP, and lower ratings of PD. Finally, stronger expression of SPS Negative traits predicted higher scores on all of the IRI/EI subscales except for PT. Examination of the 95 % CIs for indirect effect contrasts confirmed that: (a) SPS Positive and SPS Negative were stronger mediators of EC than TAS-20 scores; (b) SPS Positive was a stronger mediator of PT than TAS-20; (c) SPS Positive and SPS Negative traits were equally strong mediators of FS and EMP scores; and (d) SPS Negative and TAS-20 were both stronger mediators of PD than SPS Positive scores.

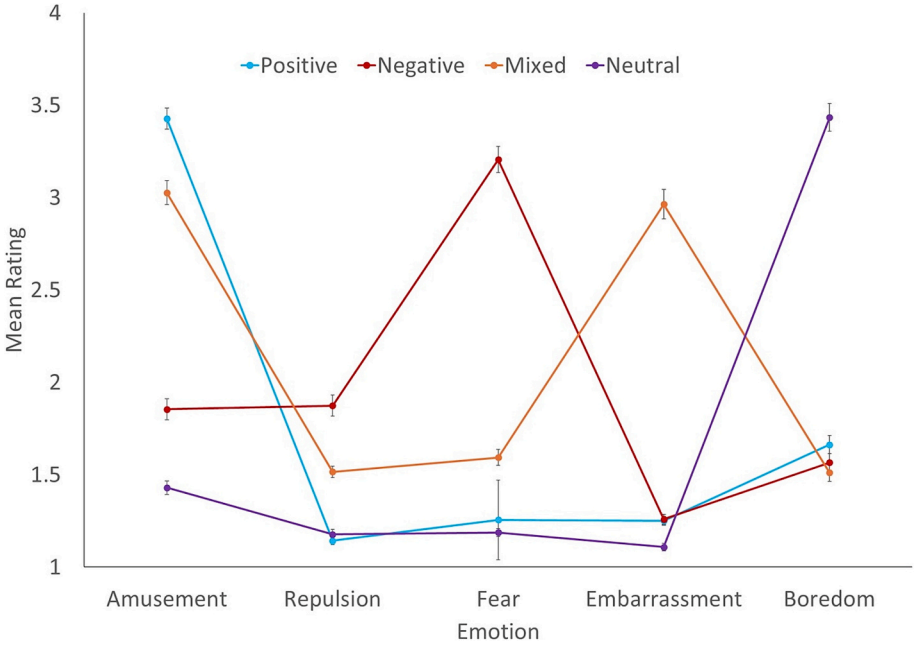


**Fig. 1.** Mean ratings given to each of the measured emotions when viewing the four film types.

**Table 1**
Descriptive Statistics for Behavioural Task and Self-Report Measures.

| | Behavioural Measures of Emotion Contagion | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Film Type | Primary emotion (range 1 to 5) | | | | Dispersion (range 0 to 5) | | | |
| | Positive | Mixed | Negative | Neutral | Positive | Mixed | Negative | Neutral |
| *M* | 3.4 | 3.0 | 3.2 | 3.4 | 1.6 | 2.5 | 2.2 | 1.4 |
| *SD* | 0.8 | 0.7 | 1.0 | 1.0 | 0.6 | 0.8 | 0.9 | 0.7 |

| | Self-Report Measures | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | TAS-20 | SPS Pos | SPS Neg | EC | PT | FS | PD | EMP | eaCTQ |
| *M* | 52.6 | 4.6 | 4.1 | 19.0 | 17.4 | 16.1 | 11.5 | 13.2 | 9.8 |
| *SD* | 11.3 | 0.8 | 1.1 | 4.7 | 4.3 | 5.3 | 4.9 | 5.3 | 4.9 |

*Note.* The primary emotions for the positive, mixed, negative, and neutral film types used in the behavioural task were amusement, an amusement/embarrassment blend, fear, and boredom, respectively. TAS-20, Toronto Alexithymia Scale; SPS Pos and SPS Neg, positive and negative traits associated with sensory processing sensitivity; eaCTQ, Emotional Abuse subscale of the Childhood Trauma Questionnaire. Subscales of the Interpersonal Reactivity Index/Empathy Index: EC, Empathic Concern; PT, Perspective Taking; FS, Fantasy; PD, Personal Distress; EMP, Empathy/Emotional Contagion.

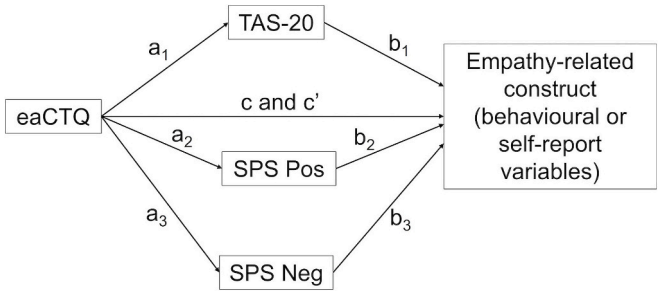


**Fig. 2.** The general form of the mediation analyses. The predictor was the score on the Emotional Abuse subscale of the Childhood Trauma Questionnaire (eaCTQ). The mediators included the total score on the Toronto Alexithymia Scale-20 (TAS-20), a composite score for positive traits associated with sensory processing sensitivity (SPS Pos), and a composite score for negative traits associated with sensory processing sensitivity (SPS Neg). The outcome variable in a given analysis was either a behavioural measure of emotion contagion or a self-report measure tapping into one of the empathic processes captured by the Interpersonal Reactivity Index or the Empathy Index.

## 4. Discussion

The findings from the current study are consistent with the view that emotional abuse in childhood can exacerbate certain personality traits that shape empathic tendencies in later life. The findings from the IRI/EI also clearly highlight the importance of considering the *relative* strengths of particular traits or trait clusters when trying to predict individual differences in self-reported empathy. SPS Positive and SPS Negative traits were equally strong, positive mediators of the links between childhood emotional abuse and both FS and EMP scores. The same pattern was seen in the model predicting EC, although in this case alexithymia emerged as an additional, weaker, negative mediator. Whereas SPS Positive traits were associated with enhanced ability to see things from another's perspective, alexithymia was (more weakly) associated with a reduced ability to do so. Finally, although all three personality variables mediated the link between childhood emotional abuse and experiencing personal distress in tense situations, the direction and strength of these effects varied. SPS Positive traits predicted lower levels of distress; in contrast, alexithymia and SPS Negative traits predicted higher levels of distress, with these two variables being the strongest mediators of PD overall.

In the behavioural task, SPS positively mediated the strength of participants' primary emotional responses to the film clips, with stronger expression of SPS Positive traits being linked to heightened feelings of amusement when watching people in positively-valenced film clips, and stronger expression of SPS Negative traits predicting greater fear when watching people in negatively-valenced clips. Additionally, alexithymia emerged as a positive mediator of the number of emotions participants felt while watching people in negatively-valenced clips. Overall, the findings support previous claims that alexithymia generally interferes with empathic processes (Aaron et al., 2015; Banzhaf et al., 2018; Brewer et al., 2019; Butera et al., 2023; Decety & Moriguchi, 2007; Di Tella et al., 2020; McQuarrie et al., 2023; Patil & Silani, 2014a, 2014b) while SPS generally promotes them (McQuarrie et al., 2023; Schaefer et al., 2022).

**Table 2**
Models showing Significant Mediation Between Childhood Emotional Abuse and Behavioural Measures of Emotional Contagion via Personality Variables.

| DV | Film type | M | Effect of M on DV | Direct effect | Indirect effect | Total effect |
|---|---|---|---|---|---|---|
| | | | b [95 % CI] | c' [95 % CI] | ab [95 % CI] | c [95 % CI] |
| Primary emotion | Positive | TAS-20 | −0.01 [−0.02, 0.004] | −0.01 [−0.04, 0.01] | −0.004 [−0.01, 0.002] | −0.01 [−0.03, 0.01] |
| | | **SPS Pos** | **0.17 [0.01, 0.33]** | | **0.006 [0.0001, 0.01]** | |
| | | SPS Neg | 0.04 [−0.09, 0.18] | | 0.002 [−0.004, 0.01] | |
| | Negative | TAS-20 | −0.01 [−0.02, 0.005] | −0.01 [−0.04, 0.02] | −0.01 [−0.01, 0.003] | −0.01 [−0.04, 0.02] |
| | | SPS Pos | −0.01 [−0.21, 0.18] | | −0.0004 [−0.01, 0.01] | |
| | | **SPS Neg** | **0.34 [0.19, 0.50]** | | **0.01 [0.002, 0.03]** | |
| Dispersion | Negative | **TAS-20** | **0.01 [0.002, 0.03]** | 0.002 [−0.03, 0.03] | **0.01 [0.002, 0.02]** | 0.01 [−0.02, 0.04] |
| | | SPS Pos | 0.08 [−0.10, 0.25] | | 0.003 [−0.003, 0.01] | |
| | | SPS Neg | −0.09 [−0.23, 0.06] | | −0.003 [−0.01, 0.002] | |

*Note*. 95 % confidence intervals (CIs) shown in bold are significant. Percentile bootstrap (Boot) CIs for the indirect effects were calculated using 5000 bootstrapped samples. DV, dependent variable; M, mediator; TAS-20, Toronto Alexithymia Scale; SPS Pos and SPS Neg, positive and negative trait clusters associated with sensory processing sensitivity.

**Table 3**
Significant Mediations Between Childhood Emotional Abuse and Self-reported Empathy via Personality Variables.

| DV | M | Effect of M on DV | Direct effect | Indirect effect | Total effect |
|---|---|---|---|---|---|
| | | b [95 % CI] | c' [95 % CI] | ab [95 % CI] | c [95 % CI] |
| EC | **TAS-20** | **−0.14 [−0.20, −0.08]** | −0.01 [−0.14, 0.11] | **−0.08 [−0.15, −0.03]** | 0.01 [−0.13, 0.15] |
| | **SPS Pos** | **1.37 [0.53, 2.22]** | | **0.05 [0.01, 0.10]** | |
| | **SPS Neg** | **1.60 [0.91, 2.29]** | | **0.06 [0.01, 0.13]** | |
| PT | **TAS-20** | **−0.12 [−0.18, −0.06]** | 0.06 [−0.06, 0.18] | **−0.07 [−0.13, −0.03]** | 0.05 [−0.07, 0.18] |
| | **SPS Pos** | **1.52 [0.70, 2.34]** | | **0.05 [0.01, 0.10]** | |
| | SPS Neg | 0.49 [−0.18, 1.15] | | 0.02 [−0.01, 0.06] | |
| FS | TAS-20 | 0.01 [−0.05, 0.08] | 0.06 [−0.07, 0.19] | 0.01 [−0.03, 0.06] | **0.21 [0.06, 0.37]** |
| | **SPS Pos** | **2.71 [1.84, 3.57]** | | **0.09 [0.02, 0.16]** | |
| | **SPS Neg** | **1.37 [0.66, 2.08]** | | **0.05 [0.01, 0.11]** | |
| EMP | TAS-20 | −0.001 [−0.06, 0.06] | 0.01 [−0.12, 0.14] | −0.001 [−0.04, 0.04] | 0.14 [−0.01, 0.30] |
| | **SPS Pos** | **1.04 [1.17, 1.91]** | | **0.03 [0.003, 0.08]** | |
| | **SPS Neg** | **2.54 [1.83, 3.25]** | | **0.10 [0.02, 0.18]** | |
| PD | **TAS-20** | **0.07 [0.01, 0.13]** | 0.11 [−0.01, 0.24] | **0.04 [0.003, 0.09]** | **0.21 [0.07, 0.35]** |
| | **SPS Pos** | **−1.09 [−1.93, −0.25]** | | **−0.04 [−0.08, −0.004]** | |
| | **SPS Neg** | **2.36 [1.67, 3.04]** | | **0.09 [0.02, 0.17]** | |

*Note.* 95 % confidence intervals (CIs) shown in bold are significant. Percentile bootstrap (Boot) CIs for the indirect effects were calculated using 5000 bootstrapped samples. DV, dependent variable; M, mediator; TAS-20, Toronto Alexithymia Scale; SPS Pos and SPS Neg, positive and negative trait clusters associated with sensory processing sensitivity. Subscales of the Interpersonal Reactivity Index/Empathy Index: EC, Empathic Concern; PT, Perspective Taking; FS, Fantasy; PD, Personal Distress; EMP, Empathy/Emotional Contagion.

### *4.1. Links between childhood emotional abuse and personality traits*

Our finding that childhood emotional abuse was associated with increased levels of alexithymia is consistent with the results of two recent meta-analyses (Ditzer et al., 2023; Khan & Jaffee, 2022). Effect size estimates between childhood emotional abuse and alexithymia in both meta-analyses ($r = 0.21$) are similar to the effect size estimate reported in the present study (Table S2, $r = 0.26$). One possible explanation for this positive relationship is that children who experience emotional abuse from caregivers may be less likely to observe and be reinforced for displaying positive examples of emotion regulation and expression. As a result, these children may grow up to display the emotion processing difficulties characteristic of alexithymia (Ditzer et al., 2023).

Exposure to childhood emotional abuse also appears to exacerbate the tendencies to be hypersensitive to both unpleasant stimuli (an SPS Negative trait) and to subtle internal, interpersonal, and contextual cues, regardless of their valence (SPS Positive traits). This is consistent with neuroimaging research demonstrating that the experience of adversity in childhood is associated with increased neural activity during the viewing of emotional stimuli in regions involved with emotional processing, including the insula and anterior cingulate cortex (Ganzel et al., 2013; Peters et al., 2019). These neural regions have also been shown to be overactive in individuals with SPS (Acevedo et al., 2014). Although possessing strong SPS Negative traits could increase distress and anxiety in emotionally traumatized children, these difficulties may be mitigated to some extent in those who also strongly express SPS Positive traits (c.f. Gulla & Golonka, 2021).

### *4.2. Alexithymia and sensory processing sensitivity as mediators*

The following section will explore potential explanations for why the personality traits of alexithymia and SPS mediated the relationships between childhood emotional abuse and empathic processes. Our data suggest that the traits differ in the roles they played in mediating these relationships.

The two SPS trait clusters acted as positive mediators influencing: (a) the primary reactions viewers had to the film clips in the behavioural task; (b) the EMP scores, which reflect awareness that one is experiencing emotional contagion; and (c) the FS scores, which reflect the tendency to mentally project oneself into scenarios depicted in narratives. More specifically, the Positive aspect of SPS predicted subjective ratings of amusement elicited by positively-valenced films, and the SPS Negative aspect predicted subjective ratings of fear elicited by negatively-valenced films. Both SPS trait clusters also positively mediated awareness that one is experiencing emotional contagion (i.e., the EMP ratings of the IRI/EI). Consciously experiencing strong reactions in response to another would make events more salient, prompting deeper processing (Aron et al., 2012). We have argued elsewhere that this might explain why SPS is linked to higher FS scores. If individuals with SPS find events unfolding in narratives that trigger strong emotional reactions highly salient, this may prompt them to use their imagination and to draw on their own past experiences to help them understand how they would think, feel, or act in circumstances like those being faced by the characters (Jakobson et al., 2024).

Our findings suggest that the relative strength of SPS Positive and alexithymic traits help to explain individual differences in PT. These findings replicate past results (McQuarrie et al., 2023). Being more sensitive or attuned to subtle interpersonal cues could help an individual scoring higher in SPS Positive traits identify the thoughts and feelings of another. However, this ability may be diminished in those who also score high on alexithymia given that the ability to identify what another person may be feeling depends, in part, on the ability to accurately identify emotions in oneself (Smith et al., 2018). Interestingly, in the current study and in a prior study (McQuarrie et al., 2023), individuals scoring higher in alexithymia experienced a greater number of emotions (i.e., more dispersion) when viewing emotional film clips—especially those with negative valence. This lack of emotional granularity may contribute to the difficulties they experience with emotional appraisal and PT.

Finally, consider the fact that all three mediators predicted both PD and EC, albeit in different ways. Stronger expression of SPS Negative traits predicted higher scores on both subscales. In contrast, whereas stronger expression of alexithymia predicted lower EC but higher PD, stronger expression of SPS Positive traits did the reverse. These findings may help to explain why the ability to *feel for* someone does not necessarily predict how one might *act toward* that person in real life (Jordan et al., 2016). If someone scores high on alexithymia and SPS Negative traits, their heightened sensitivity to negative stimuli may increase the salience of unpleasant events, promoting longer (e.g., Luminet et al., 2021) and deeper (e.g., Jakobson et al., 2024) processing of threatening or distressing situations. If this leads to greater PD, it may make it more difficult for these individuals to regulate their emotions effectively. Indeed, both alexithymia and the Ease of Excitation SPS subscale, which belongs to the SPS Negative trait cluster (Jakobson et al., 2024), have been linked to the use of emotion suppression, which

is considered to be a maladaptive form of emotion regulation (Eşkisu et al., 2022; Preece et al., 2023).

Alexithymia has also been associated with other maladaptive emotion regulation strategies such as behavioural withdrawal and ignoring, and with reduced use of adaptive strategies such as cognitive reappraisal, approaching problems, and seeking social support (Preece et al., 2023). It is possible that individuals scoring high on alexithymia, in particular, may experience high levels of distress in tense interpersonal situations due to these emotion regulation difficulties. Experiencing high levels of personal distress without corresponding high levels of sympathy or concern for another may then impact one's desire to act in a prosocial manner (Maibom, 2019).These effects could be partially offset, however, in those who also score high on SPS Positive traits, which were linked with lower levels of PD and higher EC in the current study. This buffering effect may reflect the successful application of adaptive emotion regulation strategies. In support of this, Aesthetic Sensitivity (which belongs to the SPS Positive trait cluster; Jakobson et al., 2024) has been linked to greater use of cognitive reappraisal—considered an adaptive strategy of emotion regulation (Eşkisu et al., 2022).

### 4.3. Limitations and future directions

As mentioned previously, the reliability of the BC subscale of the IRI/EI was poor and so this subscale was not included in our analyses. Future research should be directed at improving the reliability of this subscale so that it can be used to investigate how awareness of one's motor mimicry contributes to empathy and relates to childhood emotional abuse and various personality traits. Some research utilizing physiological measures of motor mimicry (e.g., facial electromyography) suggests that those scoring high on alexithymia exhibit less spontaneous mimicry of others' facial expressions than those scoring low on this trait (Franz et al., 2021). Whether the strength of this effect varies as a function of individual differences in the expression of SPS is unknown, although it seems likely that SPS would be linked to stronger mimicry and body awareness.

This study used a brief self-report measure of emotional abuse requiring adult participants to reflect on their childhood experiences. This may have limited the reliability of the reports of abuse; however, it should be noted that subscale scores of the CTQ have been found to significantly predict abuse ratings made by professionals (Bernstein et al., 2003). The eaCTQ does not, however, provide information about the onset, duration, or frequency of exposure to emotional abuse. It will be important to gather this information in future studies, as these variables could impact the strength of observed relationships. We also relied exclusively on self-report measures of personality. Use of structured interviews or multi-method assessment would be beneficial in future work examining these variables; nonetheless, the personality measures selected have been found to be both valid and reliable (Aron & Aron, 1997; Bagby et al., 2020; Evans & Rothbart, 2007).

Mediation analysis assumes that a causal chain exists, wherein the independent variable affects the mediator, which then affects the outcome variable. However, one cannot rule out the possibility that the variables under study are merely correlated with one another. As such, the use of a cross-sectional study design in the present study does not provide the strongest possible test of the proposal that childhood emotional abuse exacerbates the expression of alexithymia and SPS, or that these personality traits directly influence the development of empathy, as predicted. Confirmation could only come from studies employing longitudinal designs.

Future research could also explore how the present results relate to attachment styles. Children learn socio-emotional skills through interactions with their environment and caregivers. Attachment theory (Bowlby, 1969, 1973) provides explanations for the impact these early relationships can have on social and emotional functioning. Therefore, attachment theory can provide insights into potential mechanisms of empathy development. A secure attachment style has been shown to be positively correlated with empathy (Xu et al., 2022), perhaps because responsive caregiving allows for either the modeling of empathic responses or the proper development of emotion regulation skills that can then be employed in interpersonal interactions (Troyer & Greitemeyer, 2018). A negative relationship has also been found between an avoidant attachment style and empathy, as individuals with an avoidant attachment style develop negative beliefs about the needs of others and avoid close interactions (Mikulincer et al., 2001; Xu et al., 2022). Additionally, both SPS and alexithymia have been positively related to an insecure, anxious attachment style (Besharat & Khajavi, 2013; Şengül-İnal et al., 2018). Therefore, the development of an insecure attachment style may help explain the mediating effects of SPS and alexithymia on empathy as shown in the present study and why these relationships deserve further attention from researchers.

## 5. Conclusion

The present findings suggest a potential mechanism through which childhood emotional abuse may impact the development of a range of empathic processes in adulthood. We propose that: (a) experiences of emotional abuse exacerbate features of both SPS and alexithymia; (b) being highly sensitive makes emotional events more salient and promotes deeper processing of them; (c) being highly sensitive to feelings of personal discomfort (an SPS Negative trait) and experiencing a lack of emotional granularity (a feature of alexithymia) disproportionately interfere with the processing of negative emotions in oneself or others, negatively impacting the development of empathic concern and perspective-taking and increasing feelings of personal distress when faced with others' suffering; and (d) strong expression of SPS Positive traits can help one manage feelings of personal distress, potentially allowing one to act toward others with greater compassion. These findings are important for theory building and may inform the development of individualized interventions for those displaying empathy deficits, low levels of prosocial behaviour, and/or antisocial tendencies.

## CRediT authorship contribution statement

**Amanda M. McQuarrie:** Writing – review & editing, Writing – original draft, Formal analysis, Data curation, Conceptualization. **Stephen D. Smith:** Writing – review & editing, Supervision, Formal analysis, Data curation, Conceptualization. **Lorna S. Jakobson:** Writing – review & editing, Supervision, Formal analysis, Data curation, Conceptualization.

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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.actpsy.2025.104903.

## Data availability

The dataset for this study can be found in the "Abuse and Empathy" repository https://doi.org/10.5683/SP3/MKSTPY.

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