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RESEARCH ARTICLE

# Negative affect provides a context for increased distrust in the daily lives of individuals with a history of childhood maltreatment

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**Abstract**

Evidence on individuals affected by posttraumatic stress disorder (PTSD) following childhood maltreatment (CM) supports cognitive models suggesting that trauma engenders distrust and interpersonal threat sensitivity. We examined the associations between CM and both distrust and interpersonal threat sensitivity in daily life and investigated whether momentary negative affect (NA) provides a context that strengthens this association. Hypotheses were based on cognitive models of trauma and the feelings-as-information theory. In a 7-day ambulatory assessment study with six semirandom daily prompts (2,295 total), we measured self-reported momentary NA and assessed behavioral trust as well as interpersonal threat sensitivity via facial emotion ratings with two novel experimental paradigms in 61 participants with varying levels of CM (45,900 total trials). As hypothesized, NA was associated with increased momentary distrust, $\beta = .03$, $p = .002$, and interpersonal threat sensitivity, $\beta = -.01$, $p = .021$. Higher levels of CM were associated with more negative emotion ratings, independent of affective context, $\beta = -.07$, $p = .003$. Momentary behavioral distrust was associated with CM at high levels of momentary NA, $\beta = .02$, $p = .027$. The findings for both tasks support the feelings-as-information theory and suggest that cognitive alterations surrounding distrust and interpersonal threat, which were originally proposed for PTSD, likely also affect individuals with a history of CM.

Childhood maltreatment (CM), defined by the World Health Organization (WHO) as "the physical, sexual, mental abuse and/or neglect of children younger than 18 years" (p. 8; Sethi et al., 2018), is highly prevalent in the general population (i.e., 40%–50%; Stoltenborgh et al., 2015). CM can have detrimental long-term effects on physical and mental health (Leeb et al., 2008), including an increased risk of developing posttraumatic stress disorder (PTSD; e.g., Kessler et al., 2017; Perrin et al., 2014). The cognitive model of PTSD posits that experiencing trauma, such as CM, engenders negative cognitions about the world, other people, and one's self (Ehlers & Clark, 2000). Among others, these cognitions include distrust (e.g., "I cannot trust anyone") and perceived threat from others (e.g., "Others

could harm me"), both of which can substantially impair relationships and social functioning (Nelson et al., 2002; Resick & Schnicke, 1993).

Previous studies in CM samples have demonstrated that CM is associated with increased distrust and interpersonal threat sensitivity. One common way to measure interpersonal threat sensitivity in psychopathology research is to assess participants' reactions to pictures of faces showing negative expressions. Researchers have used a variety of tasks for this purpose, including visual attention tasks (e.g., Seitz et al., 2021) and emotion rating tasks (e.g., Bell et al., 2017), all of which use pictures of emotional faces as potentially threat-inducing stimuli. These images include faces showing fear and sadness (e.g., Bell et al., 2017; Bertsch et al., 2017; Cowden Hindash et al., 2019; Fonzo et al., 2010; Seitz et al., 2021), which can signal potential threat in the environment, thus invoking fear in the participant or signaling that something threatening has invoked sadness. Some researchers have also used images of faces displaying expressions of anger or disgust (e.g., Bell et al., 2017; Bertsch et al., 2017; Chu et al., 2016; Cowden Hindash et al., 2019; Fonzo et al., 2010; Seitz et al., 2021), signaling that the displayed person itself may be a threat to the observer. In addition to negative emotional expressions, all of these studies have also included either neutral or positive (i.e., happy or joyful) expressions as a comparison condition. With regard to CM evidence, previous studies have shown associations between CM and the overattribution of anger, contempt, and fear to neutral faces (Catalana et al., 2020; Pfaltz et al., 2019); the misclassification of emotional and neutral faces as angry (Seitz et al., 2021); and negative evaluations of angry and fearful faces (Hepp et al., 2021). Individuals who have experienced trauma have also been found to prefer a larger interpersonal distance between themselves and others (Lüönd et al., 2022; Maier et al., 2020), which may also be related to interpersonal threat sensitivity, as intrusions into one's personal space can induce a sense of discomfort and feelings of interpersonal threat (Hayduk, 1983).

Regarding distrust, two studies have demonstrated a negative association between CM and self-reported interpersonal trust (Pepin & Banyard, 2006; Vaile Wright et al., 2010), and another recent study found an association between CM and behavioral distrust in an economic game (Hepp et al., 2021). Behavioral measures of trust originally stem from the field of behavioral economics (Thielmann et al., 2021) and are an important addition to other—primarily attitudinal—measures of trust. Different types of trust games exist. These games typically employ a forced-choice format to infer a preference for one of two options (e.g., trust the other player or do not trust her/him); these options are associated with monetary gains or losses depending on whether the other player behaves in a trustworthy manner or not. Compared to similar trust-related games previously used in samples of individuals with a trauma history (Lenow et al., 2015; Sellnow et al., 2021), the distrust game enables a more straightforward assessment of the expected trustworthiness of the interaction partner (Thielmann & Hilbig, 2014). Thus, previous work suggests that CM entails increased distrust toward others and a more negative appraisal of emotional expressions, potentially due to higher sensitivity toward possible signs of interpersonal threat, as suggested by cognitive models of PTSD (Ehlers & Clark, 2000; Resick & Schnicke, 1993).

What remains unclear is how prevalent distrust and interpersonal threat sensitivity are in the daily lives of people with varying levels of CM. It is highly probable that both are context-dependent (see Weiss et al., 2021). One context in which increased levels of distrust and interpersonal threat sensitivity may occur is a state of negative affect (NA). This is suggested by the "feelings-as-information" theory, which proposes that affective states serve as a source of information when making evaluative judgments (Schwarz & Clore, 1983). In line with this, laboratory studies in healthy participants have shown associations between NA and the evaluation of others as less trustworthy (Dunn & Schweitzer, 2005), reduced trust behavior in a trust game (Mislin et al., 2015), and negatively biased processing of facial emotional expressions (Schmid & Schmid Mast, 2010). Additionally, the findings from a recent daily life study suggest that behavioral distrust is increased in moments of heightened NA among individuals without mental health problems (S. E. Schmitz et al., 2021). If individuals with more severe CM showed higher interpersonal threat sensitivity and higher levels of behavioral distrust in daily life, and if momentary NA further strengthened this association as a relevant context variable, these associations could be addressed therapeutically to improve interpersonal functioning, which is often impaired in individuals with a history of CM (Pfaltz et al., 2022).

Consequently, the present study used ambulatory assessment (AA; Trull & Ebner-Priemer, 2020) to investigate whether momentary NA provides a context for increased distrust and interpersonal threat sensitivity in the daily lives of individuals with a history of CM. We employed two experimental paradigms to measure behavioral distrust and interpersonal threat sensitivity, which were carefully established in a previous AA study with an independent sample of mentally healthy participants (S. E. Schmitz et al., 2021) and applied cross-sectionally to a large web-based sample of individuals with a CM history (Hepp et al., 2021). Thus, before applying the paradigms in this study, previous research had demonstrated both within-participant outcome variance and between-participant outcome variance, depending on the level of CM experienced.

We preregistered the study methods prior to data collection (https://osf.io/tw7mx). This included the recruited sample, the AA sampling scheme, the two paradigms, and self-report measures. In the preregistration document, we additionally specified multivariate, multilevel mediation analyses to test complex associations among NA, distrust, interpersonal threat sensitivity, CM, and interpersonal events. The inclusion of the interpersonal events variables was beyond the scope of this manuscript; therefore, a future manuscript will describe results related to interpersonal events as well as the complex preregistered analyses. Herein, we tested individual paths of the multivariate model we preregistered but not the full model; hence, we refrain from calling these tests, and the respective hypotheses, preregistered. All presented analyses are primary analyses of the data, and they have not been previously reported.

Hypotheses were based on the cognitive model of PTSD, which suggests that trauma engenders increased distrust and interpersonal threat sensitivity (Ehlers & Clark, 2000; Resick & Schnicke, 1993), as well as on previous empirical work showing that this extends to individuals with CM (Catalana et al., 2020; Hepp et al., 2021; Pepin & Banyard, 2006; Pfaltz et al., 2019; Vaile Wright et al., 2010). In addition, the hypotheses are rooted in the feelings-as-information theory (Schwarz & Clore, 1983), which has seen empirical support in previous work (Dunn & Schweitzer, 2005; Mislin et al., 2015; Schmid & Schmid Mast, 2010; S. E. Schmitz et al., 2021). First, we hypothesized that higher levels of CM would be associated with a more negative rating of facial expressions "in the moment," which we interpreted as a proxy for interpersonal threat sensitivity. In addition, we posited that higher momentary NA would be associated with a more negative rating of facial expressions in the moment. We also expected that momentary NA would strengthen the association between CM and ratings of facial expressions (i.e., NA as a momentary moderator). Second, we hypothesized that higher levels of CM would be associated with more momentary distrust. We additionally expected that higher momentary NA would be associated with higher ratings of momentary distrust and that momentary NA would strengthen the association between CM and momentary distrust (i.e., NA as a momentary moderator).

# METHOD

## Participants

We determined the sample size, data exclusions, manipulations, and study measures a priori (https://osf.io/tw7mx). We preregistered a sample size of 70 individuals with varying levels of CM. Due to lockdown measures resulting from the COVID-19 pandemic, data collection had to be interrupted and eventually terminated when only 62 participants had been recruited. Of note, increasing the sample size from 62 to 70 participants increased power by 0.1% for CM, 2.1% for the cross-level interaction, and 6.5% for momentary NA. Participants were recruited via different online (e.g., project homepage, social media) and offline sources (e.g., newspaper advertisements, local clinics) as part of a research consortium on the consequences of adverse childhood experiences (https://grk2350.de). We included individuals with varying levels of CM, as assessed using the Childhood Trauma Screener (CTS; Grabe et al., 2012), a short-form version of the Childhood Trauma Questionnaire (CTQ; Bernstein & Fink, 1998). If participants endorsed at least one of the five CTS items (i.e., one item per CM type), they were included in the study. Exclusion criteria were defined in accordance with other research consortium projects and included a lifetime diagnosis of schizophrenia or bipolar I disorder, the use of psychotropic medication except for selective serotonin reuptake inhibitors and serotonin and norepinephrine reuptake inhibitors, inadequate German language proficiency, the acute threat of harming oneself or others, brain disease, severe internal or neurological diseases, current pregnancy, and the current use of illegal substances. Participants with a moderate or severe substance use disorder (SUD) had to be in remission for 12 months or longer, and those with a mild SUD had to be in remission for 2 months or longer. One participant was excluded due to technical difficulties that resulted in AA data loss. The final dataset included 61 participants aged 19 to 59 years ($M$ = 31.52 years, $SD$ = 10.51), 88.5% of whom were women and 11.5% of whom were men. Most participants had a lifetime diagnosis of a mental disorder (75.4%), and 60.7% had previously received outpatient treatment. See Table 1 for details on demographic data and Table 2 for detailed diagnoses.

## Procedure

Study procedures were approved by the Ethics Committee of the Medical Faculty Mannheim at Heidelberg University (protocol no. 2018–588N-MA). All participants provided written informed consent before in-person participation. Eligibility was determined via a phone screening. If participants reported CM during the screening, they were invited for an in-person diagnostic session during which the exclusion criteria and mental health diagnoses were assessed. Diagnoses were based on criteria outlined in the *Diagnostic and Statistical Manual of Mental Disorders* (5th ed.; *DSM-5*; American Psychiatric Association, 2013) and established by trained clinical psychologists using the German version of the Structured Clinical Interview for *DSM-5* (SCID-5; Beesdo-Baum et al., 2019; First et al., 2016). Interrater

**TABLE 1** Sample demographic characteristics

| Variable | *n* | % |
|---|---|---|
| Nationality | | |
| German | 58 | 95.1 |
| German-Italian | 1 | 1.6 |
| German-Chilean | 1 | 1.6 |
| Austrian | 1 | 1.6 |
| Housing situation | | |
| Alone | 18 | 29.5 |
| With partner/own family | 26 | 42.6 |
| With parents | 4 | 6.6 |
| Shared apartment | 12 | 19.7 |
| No regular living conditions | 1 | 1.6 |
| Relationship status | | |
| Single | 40 | 65.6 |
| Married | 9 | 14.8 |
| Long-term relationship | 4 | 6.6 |
| Divorced | 7 | 11.5 |
| Widowed | 1 | 1.6 |
| Formal education | | |
| Graduation after 9 years | 2 | 3.3 |
| Graduation after 10 years | 8 | 13.1 |
| Graduation after 12–13 years | 51 | 83.6 |
| Current or past psychotherapy | | |
| Inpatient/semi-inpatient treatment | 24 | 39.3 |
| Outpatient treatment | 37 | 60.7 |
| None | 18 | 29.5 |
| Current psychotropic medication | | |
| SSRI | 5 | 8.2 |
| SNRI | 4 | 6.6 |
| Discontinued for participation | 5 | 6.6 |
| None | 47 | 77.1 |
| Past suicide attempts | | |
| One | 3 | 4.9 |
| More than one | 9 | 14.75 |
| None | 49 | 80.3 |

*Note*: $N = 61$. SSRI = selective serotonin reuptake inhibitor; SNRI = serotonin and norepinephrine reuptake inhibitor.

reliability was established by randomly selecting 12 videotaped diagnostic interviews, which were rated by the head of the diagnostic unit and six independent raters. For the investigated diagnoses, there was complete agreement between the raters, Fleiss' $\kappa = 1.0$ (Fleiss et al., 1981). According to a review by Cicchetti (1994), this corresponds with an "excellent" interrater reliability. During the interview session, participants also provided demographic data, filled in self-report questionnaires, and completed a urine drug screening.

Next, participants were introduced to the study phone (Moto E, 2nd generation) running the movisensXS app (Version 1.4.8; Movisens GmbH, Karlsruhe, Germany). The AA protocol mirrored the protocol reported in S. E. Schmitz et al. (2021), except that we added several CM-specific self-report items to the random prompts. Over the 7-day study period, participants answered six pseudorandomized prompts per day. Prompts were spaced evenly across the day by dividing the daily study timeframe (i.e., 8 a.m.–10 p.m.) into six equal intervals. Within these intervals, prompts occurred randomly with at least 1 hr between two prompts. At each prompt, participants answered questions on momentary affect, dissociative symptoms, and intrusions and completed two experimental tasks to assess distrust and interpersonal threat sensitivity (cf. S. E. Schmitz et al., 2021). Although we further assessed interpersonal events and trauma-specific affect (e.g., disgust with self), these findings will be addressed in a future manuscript.

AA compliance was high, with participants completing, on average, 90.5% of the random prompts. This resulted in an average of 37.62 ($SD = 6.22$) completed prompts per person and a total of 2,295 prompts with 45,900 trials for each paradigm over 421 person-days. Participants received a compensation of 70€ (EUR), with a 30€ bonus if they completed more than 90% of the prompts. Participants required an average of 3.87 min (232.44 sec) to answer a prompt. See Supplementary Table S1 for further AA details.

## Measures

### CM

We used the German version of the CTQ (Bader et al., 2009; Bernstein & Fink, 1998) to assess self-reported CM before age 18. The CTQ comprises five subscales with five items each and is used to assess the frequency of different types of CM (i.e., emotional neglect, emotional abuse, physical neglect, physical abuse, and sexual abuse). Each item is rated on a five-point Likert-type scale ranging from 1 (*not at all*) to 5 (*very often*). The total score is calculated as the sum of all subscales and ranges from 25 to 125. In the current sample, the CTQ showed an excellent internal consistency, Cronbach's $\alpha = .95$, 95% CI [.92, .96], $\Omega = .96$.

### Momentary NA

We assessed momentary NA using a short questionnaire designed for use in e-diary studies (Wilhelm & Schoebi, 2007). At each random prompt, participants rated how they felt "at this moment" by means of six items

assessing valence (unwell–well, content–discontent), calmness (relaxed–tense, agitated–calm), and energetic arousal (tired–awake, full of energy–without energy). Items were rated on a 7-point Likert-type scale ranging from 0 to 6. Following Wilhelm and Schoebi (2007), we used the Valence and Calmness subscales to create a composite NA score. We computed a mean score for the following four items: unwell–well (reverse-scored), content–discontent, relaxed–tense, and agitated–calm (reverse-scored). We then created per-person daily score means and total person means for this variable.

## Emotion rating task

For each prompt, participants completed 20 trials of a task first described in S. E. Schmitz et al. (2021). In each trial, they saw a stimulus face displaying either a positive (i.e., happy) or negative emotion, (i.e., fear, anger, disgust, or sadness) and were asked to rate the valence of the displayed emotion on a 7-point Likert-type scale ranging from 0 (*very negative*) to 6 (*very positive*). Stimuli were created using the dynamic FACES stimulus database (Ebner et al., 2010). We fragmented each video into 10 pictures to obtain different emotional intensities (i.e., 0 = the first frame in which no emotion was present, 9 = fully expressed emotion). From this stimulus pool, we randomly selected four happy pictures and one picture for each negative emotion (i.e., fear, anger, disgust, and sadness) for each identity. Emotional intensities were counterbalanced across identities. Thus, the final stimulus set comprised 304 positive and 304 negative expressions; however, the ratio of low-intensity to neutral expressions was high. At each prompt, 10 positive and 10 negative emotional expressions were randomly selected and presented. Reliability for individual differences in emotion ratings (i.e., person averages across all AA prompts, calculated as the mean Cronbach's alpha) was excellent, $R_{KF} = .98$; reliability for individual random prompts was fair (i.e., momentary Cronbach's alpha across the 20 faces at a given prompt), $R_{1R} = .71$; and reliability for change (i.e., difference scores for face ratings from one prompt to the next) was poor, $R_C = .25$ (Shrout & Lane, 2012).

## Distrust game

At each prompt, participants completed 20 trials of a modified distrust game previously described in S. E. Schmitz et al. (2021). In the distrust game, two players receive the same initial amount of money. The trustee is then able to take away any amount from the trustor's stash to increase their own payoff. The dependent variable is the trustor's estimate of how much money the trustee will take from them, with higher amounts indicating more distrust. In the present study, participants played a hypothetical version without real monetary stakes. In each trial, the participant was shown the face of a hypothetical trustee and instructed to imagine they were playing a distrust game with that person. In the role of the trustor, participants then indicated how much money they thought the depicted trustee would take away from their own stash, ranging from 0€ to 50€ in 5€ increments. Stimuli for the trustees were 300 computerized faces that varied regarding their level of trustworthiness (Oosterhof & Todorov, 2008). We selected 100 identities for each of three levels of trustworthiness based on the stimulus set's norm ratings, including low, medium, and high levels of trustworthiness. At each random prompt, 20 stimuli were randomly drawn and presented. Reliability for individual differences in distrust ratings was excellent, $R_{KF} = .99$; reliability for individual random prompts was good, $R_{1R} = .82$; and reliability for change was fair, $R_C = .70$ (Shrout & Lane, 2012).

**TABLE 2** Current and lifetime clinical diagnoses

| Variable | Current | | Lifetime | |
|---|---|---|---|---|
| | *n* | % | *n* | % |
| No lifetime diagnosis according to SCID-5-CV | – | – | 15 | 24.6 |
| PTSD | 17 | 27.9 | 21 | 34.4 |
| Major depressive disorder, single episode | 1 | 1.6 | 8 | 13.1 |
| Major depressive disorder, recurrent episode | 11 | 18.0 | 28 | 44.3 |
| Persistent depressive disorder | 5 | 8.2 | 5 | 8.2 |
| Brief psychotic disorder | 0 | 0.0 | 1 | 1.6 |
| Substance use disorder[a] | 3 | 4.9 | 16 | 26.2 |
| Panic disorder/agoraphobia | 1 | 1.6 | 5 | 8.2 |
| Social anxiety disorder | 8 | 13.1 | 12 | 18.0 |
| Generalized anxiety disorder | 1 | 1.6 | 1 | 1.6 |
| Specific phobia | 3 | 4.9 | 3 | 4.9 |
| Obsessive–compulsive disorder | 1 | 1.6 | 2 | 3.3 |
| Anorexia nervosa | 0 | 0.0 | 6 | 9.8 |
| Bulimia nervosa | 1 | 1.6 | 6 | 9.8 |
| Somatic symptom disorder | 6 | 9.8 | 6 | 9.8 |
| Other DSM-5 Disorder | 2 | 1.6 | 5 | 8.2 |

*Note*. SCID-5–CV = Structured Clinical Interview for DSM-5 Disorders–Clinical Version; PTSD = posttraumatic stress disorder; DSM-5 = Diagnostic and Statistical Manual of Mental Disorders (5th ed.).

[a]In the case of a mild substance use disorder, abstinence of at least 2 months was required; a moderate/severe substance use disorder required abstinence of at least 12 months.

## Covariates

We preregistered dissociation and intrusions as covariates and assessed these constructs at each random prompt. Both dissociation and intrusions can substantially impact all levels of experience (i.e., cognitive, affective, and sensory), hence we wanted to ensure they did not confound the associations of interest and statistically adjusted for them.

### *Dissociative symptoms*

We assessed dissociative symptoms in the present moment using the Dissociation Tension Scale (DSS-4; Stiglmayr et al., 2009). The four DSS-4 items—one each for depersonalization, derealization, somatoform dissociation, and analgesia—are rated on a 10–point Likert-type scale ranging from 0 (*not at all*) to 9 (*very strongly*). The four-item mean was used as a covariate in all analyses.

### *Intrusions*

We assessed intrusions using a single yes/no item: "Since the last prompt, I had involuntary memories of traumatic experiences in my childhood/youth." If a respondent endorsed experiencing intrusions, they were asked to rate their impact, vividness, "nowness," intrusiveness, avoidance, and emotionality on a scale of 0 (*not at all*) to 6 (*very*), following Kleim et al. (2013). The ranging from dichotomous variable indicating whether intrusions occurred (1 = yes, 0 = no) was entered as a covariate.

### *Additional covariates*

Additional preregistered covariates were gender (female = 0, male = 1), day of the week (from Sunday = 1 to Saturday = 7), weekend (0 = weekday, 1 = weekend), time of day (in minutes; 8 a.m. = 0), and study day (1–7).

## Data analysis

All data and code necessary to reproduce these analyses are available at https://osf.io/zfsd9/. Analyses testing the study hypotheses were conducted in R. We used the *lmer* function from the *lme4* package to conduct multilevel models (MLMs) and the *lmerTest* package to obtain *p* values. We modeled random intercepts for each person and day and random slopes for momentary NA. Momentary NA was centered on the participant's day mean, daily NA was centered on the person mean, and person-level NA was centered on the grand mean. The total CTQ and stimulus valence scores were centered on the grand mean.

To test our first hypothesis (i.e., that CM, NA, and their interaction would predict emotion ratings), we conducted an MLM using emotion ratings as the criterion, predicted by the CTQ total score; momentary, day-level, and person-level NA; the CTQ x NA interaction to test moderation effects (see Hayes, 2009); stimulus valence (−9 = fully negative expressed emotion to 9 = fully positive expressed emotion); and covariates. To test our second hypothesis (i.e., CM, NA, and their interaction would predict momentary distrust), we conducted a second MLM using distrust ratings as the outcome. Predictors were the same as for the first hypothesis except that the trustworthiness of the stimulus (0 = low, 1 = medium, 2 = high trustworthiness) was included instead of stimulus valence.

## RESULTS

Total CTQ scores ranged from 27 to 117 in this sample ($M$ = 58.84, $SD$ = 21.97; see Supplementary Table S2 for descriptives, by subscale, and Supplementary Table S3 for intercorrelations between subscales). Participants indicated dissociative symptoms at 21.5% of prompts, although, on average, the levels were very low (DSS-4: $M$ = 0.50, $SD$ = 1.30).

The main results are presented in Table 3. As hypothesized, CM was a significant negative predictor of momentary emotion ratings, indicating that participants who experienced higher levels of CM tended to respond with more negative emotion ratings. Likewise, momentary NA was a significant negative predictor of emotion ratings, suggesting that participants evaluated faces more negatively when in a state of NA. Contrary to our predictions, the CM x NA interaction was nonsignificant (see Figure 1). Thus, our prediction that NA would provide a context for the association between CM and emotion ratings did not obtain sufficient support. Significant covariates were the stimulus valence (i.e., more positive stimuli were rated more positively), time of day (i.e., more negative ratings later in the day), and study day (i.e., more positive ratings later in the study). We did not observe significant effects for the intrusions and dissociation covariates.

Our second hypothesis was partially supported. We did not observe a significant main effect of CM. In contrast, momentary NA was a significant positive predictor of distrust. Additionally, there was a significant CM x NA interaction, indicating that the effect of CM on distrust was stronger in moments of elevated NA. In light of the nonsignificant CM main effect, the findings suggest that CM only predicted increased distrust in the context of heightened NA (see Figure 2 and Supplementary Tables S4 and S5). Significant covariates were stimulus trustworthiness (i.e., more trustworthy stimuli entailed lower distrust ratings), time of day (i.e., higher distrust later in the day),

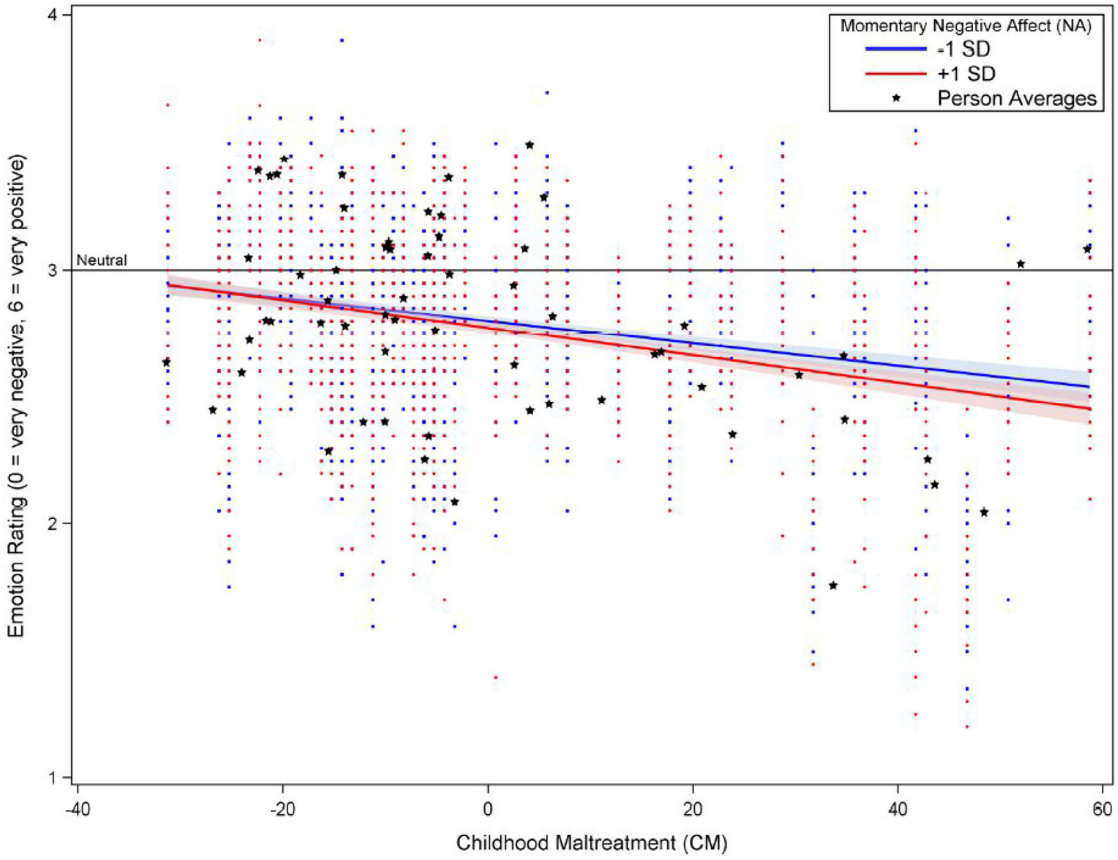


**FIGURE 1** Model plot for the linear mixed-effect model testing the effects of childhood maltreatment (CM)[a], negative affect (NA), and their interaction on emotion ratings

*Note*: The grand-mean centered level of childhood maltreatment (CM) is presented on the *x*-axis, and emotion ratings are presented on the *y*-axis. Regression lines are plotted separately for high (+1 standard deviation) versus low (-1 standard deviation) negative affect (NA; interaction term).

[a]CM was measured using the Childhood Trauma Questionnaire.

and study day (i.e., higher distrust later in the study). Additionally, the effects of both intrusions and dissociation were highly significant, suggesting increased distrust at times when the participant experienced intrusions or dissociation.

## DISCUSSION

In a 7-day AA study with preregistered methods, we examined the daily life associations between CM and both behavioral distrust and interpersonal threat sensitivity, both of which are theorized to be consequences of interpersonal trauma (Ehlers & Clark, 2000; Resick & Schnicke, 1993). Additionally, we tested whether distrust, as operationalized by a distrust game, and interpersonal threat sensitivity are increased in states of heightened NA, as proposed by the feelings-as-information theory (Schwarz & Clore, 1983). Thereby, we investigated whether momentary NA constitutes a context in which the effects of CM are strengthened. We measured behavioral distrust and interpersonal threat sensitivity using two newly developed and carefully evaluated experimental AA paradigms that were successfully applied in a previous study with an independent sample of mentally healthy individuals (S. E. Schmitz et al., 2021).

As predicted, and supporting our first hypothesis, individuals with higher levels of CM rated facial expressions more negatively in the moment. This is in line with cognitive models suggesting that people who have experienced trauma, such as CM, expect others to be potentially threatening (Ehlers & Clark, 2000; Resick & Schnicke, 1993), which can include overattributing negative emotions to neutral faces (see Catalana et al., 2020; Pfaltz et al., 2019). This finding also replicates results from a previous study by Hepp et al. (2021) in which the same paradigm was applied cross-sectionally. Moreover, as hypothesized, momentary NA was associated with more negative

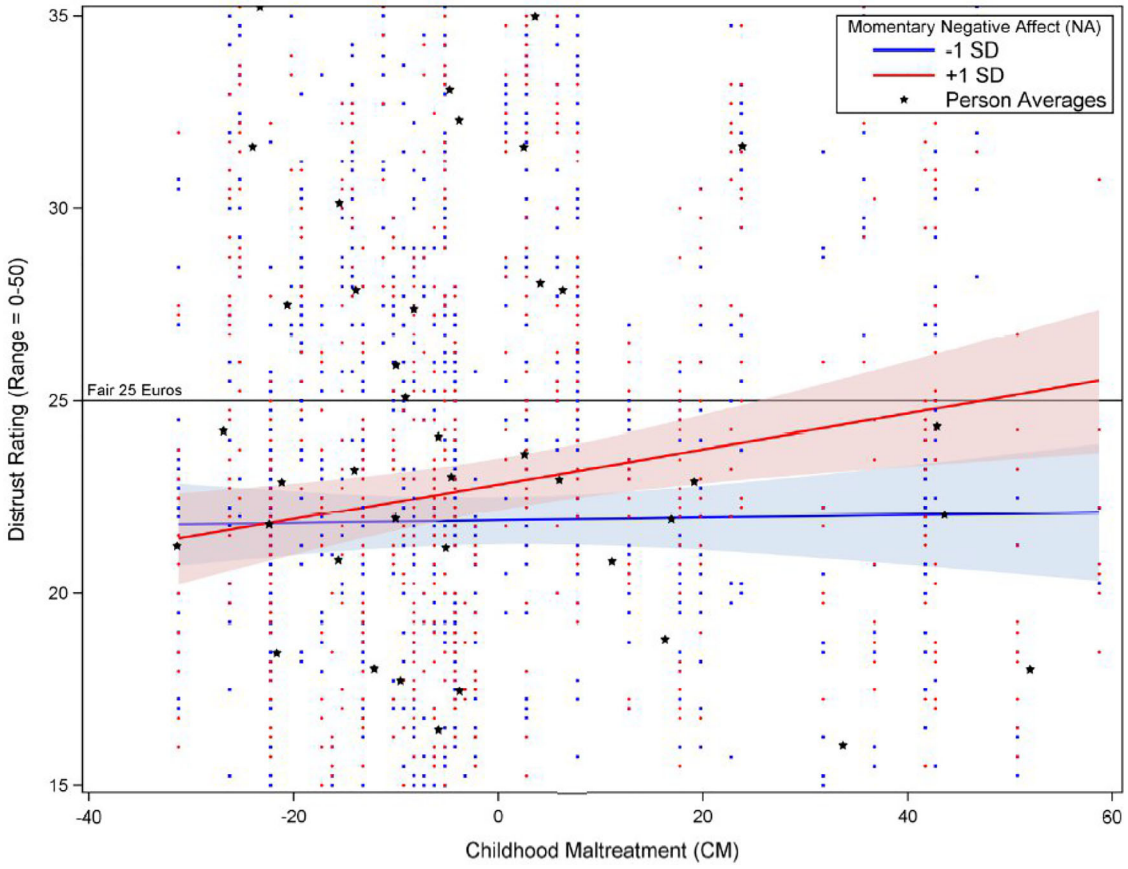


**FIGURE 2** Model plot for the linear mixed-effect model testing the effects of childhood maltreatment (CM)[a], negative affect (NA), and their interaction on emotion ratings

*Note*. The grand-mean centered level of childhood maltreatment (CM) is presented on the x-axis, and momentary distrust ratings are presented on the y-axis. Regression lines are plotted separately for high (+1 standard deviation) versus low (-1 standard deviation) negative affect (NA; interaction term).

[a]CM was measured using the Childhood Trauma Questionnaire.

emotion ratings, supporting the feelings-as-information theory (Schwarz & Clore, 1983). Contrary to our hypotheses, NA did not significantly moderate the association between CM and emotion ratings, suggesting that CM and NA might independently contribute to increased interpersonal threat sensitivity (see Figure 1). However, the effect sizes of the associations between CM and emotion ratings and between NA and emotion ratings were generally small, as commonly observed in AA studies (Hepp et al., 2018), thus warranting further studies to replicate the findings.

Our second hypothesis was partially supported. Contrary to both our expectations and previous cross-sectional findings (Hepp et al., 2021; Pepin & Banyard, 2006; Vaile Wright et al., 2010), CM did not appear to have a significant main effect on momentary distrust. Yet, upon closer inspection, the significant CM x NA interaction suggested that CM did have an effect but only at high levels of NA (see Figure 2). These results supported our hypothesis that momentary NA would strengthen the association between CM and momentary distrust and underline the importance of assessing the affective context when evaluating behavioral distrust. Clinically, this finding is relevant, as it suggests that behavioral distrust is not elevated at every moment during the daily lives of individuals who have experienced CM but rather manifests in states of heightened NA. However, as we only measured distrust using a hypothetical economic game, we cannot generalize this result to other types and contexts of distrust. Further studies are needed to replicate these results with paradigms that assess different manifestations of distrust behavior or are able to capture distrust as it occurs in real-life interactions. This provided, future research should test whether therapeutic approaches that target NA regulation could help mitigate distrust behavior in daily life. Lastly, we observed a significant positive association between momentary NA and distrust, as predicted based on the feeling-as-information-theory (Schwarz & Clore,

**TABLE 3** Results of two multilevel models using distrust and emotion ratings as outcomes predicted by momentary negative affect (NA), childhood maltreatment (CM)[a], and covariates

| Outcome and predictor | *Estimate* | *β* | *SE* | *p* |
|---|---|---|---|---|
| Emotion ratings | | | | |
| Intercept | 2.72 | −.04 | .04 | < .001 |
| CM | −0.01 | −.07 | .00 | .003 |
| Momentary NA | −0.02 | −.01 | .01 | .021 |
| CM x Momentary NA | −0.00 | −.01 | .00 | .214 |
| Day NA | −0.01 | −.004 | .01 | .368 |
| Person NA | −0.04 | −.02 | .04 | .267 |
| Stimulus valence | 0.22 | .80 | .00 | < .001 |
| Intrusions | −0.01 | −.001 | .02 | .745 |
| Dissociation | −0.01 | −.003 | .01 | .378 |
| Gender | 0.11 | .02 | .09 | .257 |
| Weekday | 0.00 | .004 | .00 | .370 |
| Weekend | −0.00 | −.001 | .01 | .864 |
| Time of day | −0.00 | −.01 | .00 | .010 |
| Study day | 0.02 | .01 | .00 | .000 |
| Distrust (monetary contributions) | | | | |
| Intercept | 21.04 | −.09 | 1.48 | < .000 |
| CM | 0.02 | .02 | .06 | .783 |
| Momentary NA | 0.67 | .03 | .20 | .002 |
| CM x Momentary NA | 0.02 | .02 | .01 | .027 |
| Day NA | 0.71 | .02 | .32 | .027 |
| Person NA | 0.49 | .02 | 1.60 | .762 |
| Stimulus trustworthiness | −8.90 | −.43 | .06 | < .000 |
| Intrusions | 1.63 | .03 | .22 | < .000 |
| Dissociation | 0.85 | .03 | .11 | < .000 |
| Gender | −4.10 | −.08 | 4.07 | .319 |
| Weekday | −0.07 | −.01 | .09 | .437 |
| Weekend | −0.14 | .00 | .39 | .714 |
| Time of day | 0.05 | .01 | .01 | .000 |
| Study day | 0.34 | .02 | .09 | .000 |

*Note*: Variables were coded as follows: stimulus valence: -9 (fully negative expressed emotion) to 9 (fully positive expressed emotion); stimulus trustworthiness: 0 (low), 1 (medium), 2 (high); intrusions: 0 (not occurred), 1 (occurred); dissociation: 0 (not at all)–9 to (very strongly); gender: 0 (female), 1 (male); weekday: from Sunday (1) to Saturday (7); weekend 0 (weekday), 1 (weekend); time of day (in minutes): 8 a.m. = 0; study day: 1–7.

[a]CM was measured using the Childhood Trauma Questionnaire.

1983). This replicates previous findings by S. E. Schmitz et al. (2021) and is in line with findings on mood-congruent trust ratings and behavior (Dunn & Schweitzer, 2005; Mislin et al., 2015). However, also in this second model, the effect sizes were small, and the findings, therefore, need to be interpreted with care. Nonetheless, it has to be taken into account that these are Trait x Situation interaction effects within a daily life context that is rich in noise and typically produces small effect sizes (Bolger et al., 2003).

The present results should be interpreted in the context of several limitations. First, the generalizability is limited due to the selectiveness of the sample (88.5% White cisgender women). The study was part of a research consortium that recruited widely throughout the region through advertisements placed on public transport, in local newspapers and on newspaper websites, in local clinics, and on social media platforms. Nonetheless, we were unable to recruit a sample that adequately represents the population of individuals affected by CM. Prevalence rates of CM differ substantially by gender and continent (Moody et al., 2018). Epidemiological data on CM prevalence in gender nonconforming and transgender people is largely lacking, but data from small samples suggest elevated rates of CM in this group (see Schnarrs et al., 2019). Additionally, the sample included almost exclusively White participants, which poorly reflects the fact that CM is more prevalent in people of color (Mersky & Janczewski, 2018). We assume that despite our best recruitment efforts, this sample is mostly representative of individuals who had previously received or were currently seeking treatment at our clinic.

Second, the study was limited by the hypothetical nature of the distrust game, as participants did not have real interaction partners and incentives (see Hepp et al., 2021). Studies investigating whether individuals behave differently with real interaction partners and incentives have come to various conclusions, with some demonstrating that hypothetical games are feasible (e.g., Thielmann et al., 2016) and others criticizing this method of assessment (e.g., Baumeister et al., 2007). Future studies could endeavor to replicate the present results, possibly by integrating real-life interaction partners as players in the distrust game.

A third limitation relates to our operationalization of interpersonal threat sensitivity via a valence rating of facial emotional expressions. Although other studies also used negative emotional facial stimuli to assess interpersonal threat sensitivity or threat bias in samples of individuals with a history of trauma (e.g., Bell et al., 2017; Bertsch et al., 2017; Chu et al., 2016; Cowden Hindash et al., 2019; Fonzo et al., 2010; Seitz et al., 2021), it is likely that other factors may have contributed to negative evaluations of facial expressions. Most prominently, current mood has an effect on emotion recognition (Schiffenbauer, 1974; Schmid & Schmid Mast, 2010). In addition, variations of paradigms that were previously used to study threat sensitivity in general, like the threat of predictable and unpredictable aversive events (the NPU threat task; A. Schmitz & Grillon, 2012) or the Posner spatial orienting paradigm (Posner, 1980; Raymond et al., 2021), could be used to differentiate the effects of general threat sensitivity from

interpersonal threat sensitivity by introducing interpersonal stimuli into the experimental design.

Fourth, with NA, we assessed only one relevant daily life context for distrust and interpersonal threat sensitivity, and there are likely other relevant everyday contexts that could be addressed in future research. For instance, recent work on trust in everyday life (Weiss et al., 2021) suggests that social distance and power imbalance are important contexts for distrust, and both of these are directly relevant to CM and could inform future work.

To our knowledge, this investigation was the first daily life study to assess behavioral distrust (using a distrust game), interpersonal threat sensitivity (via the evaluation of facial emotions), and their affective context in individuals who have experienced CM. The results suggest that individuals with higher levels of CM tended to perceive facial expressions as more negative, which was independent of the affective context. In contrast, momentary distrust was only associated with CM at high levels of NA. The results indicate that the association between CM and interpersonal threat sensitivity appeared relatively stable in daily life, whereas the association between CM and distrust was limited to the context of heightened NA. The findings for both tasks are in line with the feeling-as-information theory (Schwarz & Clore, 1983) and underscore that cognitive alterations surrounding distrust and interpersonal threat, which were originally proposed for PTSD (Ehlers & Clark, 2000), also affect individuals who have experienced CM. Future studies with more diverse samples are needed to investigate additional relevant daily life contexts and naturalistic stimuli.

## OPEN PRACTICES STATEMENT

The study methods, sample size, data exclusions, and covariates were preregistered prior to data collection (https://osf.io/tw7mx). The data and code to reproduce the reported analyses can be found at https://osf.io/zfsd9/.

## AUTHOR NOTE

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## SUPPORTING INFORMATION

Additional supporting information can be found online in the Supporting Information section at the end of this article.

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