Exploring Maladaptive Emotion Regulation Strategies as a Mediator in the Relationship Between Childhood Adversity and Stress Reactivity in Adults

Aline-Florentina Sinn (s2071339)
Faculty of Behavioural Management and Social Sciences (Psychology), University of Twente

Course: Master thesis PCPT (202001489)

1st Supervisor: Thomas Vaessen

2nd Supervisor: Matthijs Noordzij

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Abstract

Background: To prevent stress from negatively impacting mental health, it is essential to understand why some individuals react stronger and have a negative affect on stress, by investigating the underlying factors of stress reactivity. Existing studies show that there is an association between exposure to childhood adversity and stress reactivity in adulthood. It was suggested, that exposure to childhood adversity may be an indicator of being more prone to stress and responding with negative emotions. Furthermore, maladaptive emotion regulation strategies were associated with childhood adversity and stress reactivity. It remains unclear whether maladaptive emotion regulation strategies can be associated with the relationship between childhood adversity and stress reactivity in adults.

Objective: The purpose of the present study was to explore whether maladaptive emotion regulation strategies play a mediating role in the association between childhood adversity and negative affective stress reactivity in adults.

Method: Secondary data of 52 participants aged between 18 and 35 years were used from De Calheiros Velozo et al. (2021), who used the repeated Montreal Imagining Stress Test (rMIST). Before the experimental stress task, the participants completed self-reported questionnaires regarding childhood adversity and emotion regulation strategies. Negative affect was measured after the baseline, control, stress, and recovery phase.

Results: The majority of the participants were exposed to childhood adversity (48 participants). The results show that childhood adversity is a significant predictor of maladaptive emotion regulation strategies, however, no mediation effect was found.

Conclusion: Based on the results of the present study, it can be implied that childhood adversity results in higher usage of maladaptive emotion regulation strategies, but these strategies cannot be associated with the relationship between childhood adversity and stress reactivity. Future research with a more representative sample (e.g. equal gender and victims

vs control group distribution) should replicate the results. Maladaptive emotion regulation strategies in general should be considered as a mediator within this association.

Keywords: childhood adversity, maladaptive emotion regulation, negative affective stress reactivity, psychopathology

Exploring Maladaptive Emotion Regulation Strategies as a Mediator in the Relationship Between Childhood Adversity and Stress Reactivity in Adults

Stress is one of the major health threats in our society, with prolonged stress being one of the main contributors to the development of psychological disorders (Fuchs et al., 2001; Cohen et al., 2007). A further variable that increases the development of these disorders is the negative affective reaction to stress (Almeid, 2005). Previous studies suggest that there is a link between exposure to childhood adversity and being more prone to negative affective stress reactivity (Heim & Nemeroff, 2001; Doom & Cicchetti, 2018). It appears that prolonged stress can be associated with exposure to childhood adversity, emphasizing the importance of determining the effect of childhood adversity on negative affective stress reactivity. However, research suggests that the ability to regulate emotions might be an important factor in reducing one's stress symptoms (Extremera & Rey, 2015). Based on this, maladaptive emotion regulation strategies that an individual employs in response to childhood adversity exposure (Kim & Cicchetti, 2010) positively influence negative affective stress reactivity (Krkovic et al., 2018a). It remains of interest to investigate the magnitude of the relation between childhood adversity, maladaptive emotion regulation strategies, and negative affective reactivity to stress in adults.

Negative Affective Stress Reactivity

Stress is a daily occurrence for nearly everyone and can have negative effects on health. Events that are appraised as challenging and stressors evoke negative emotions, especially when individuals fail to cope with them (An et al., 2019). The (often negative) change of emotions, that follow a stressor is considered an emotional or affective response (An et al., 2019). These responses predict how affected a person was by certain stressors based on their stress reactivity. Reactivity refers to the degree to which an indicator of stress (e.g., negative affect) changes immediately after a stressor appears compared to moments

without a stressor (Almeida et al., 2020). Therefore, some individuals have a higher sensitivity to daily hassles, which might result in a higher likelihood to react emotionally or physically (Almeida et al., 2005; Kiecolt-Glaser et al., 2020). A reason for this distinction is vulnerability factors (childhood adversity, sociodemographic, psychosocial, and health), which influence the effect of daily stressors on someone's daily well-being (Almeida et al., 2005; Infurna et al., 2015). Furthermore, personal resources, such as feelings of mastery and control over the environment, and environmental resources, such as social support, affect someone's coping with these stressors (Almeida et al., 2005).

To examine stress reactivity, experiment designs where stress is generated in the laboratory can be used. With the help of these, researchers can measure psychological, behavioural, and physiological states before, during, and after being exposed to a stressor (Crosswell & Lockwood, 2020). These designs measure stress exposure and reactivity close to their occurrence, which prevents bias, error, and other factors that might influence the accuracy (Crosswell & Lockwood, 2020). This is why laboratory studies provide a better understanding of stress reactivity and responses than e.g. autobiographical reports (Croswell & Lockwood, 2020). Laboratory studies on stress reactivity, however, still face challenges, such as determining the right balance between inducing enough stress to elicit a response and avoiding too much stress as that might lead to sensitization (De Calheiros Velozo et al., 2021).

Childhood Adversity

One potential factor that influences an individual's stress reactivity is exposure to childhood adversity (Infurna et al., 2015; Weltz et al., 2016). Childhood adversity regards all forms of physical and emotional maltreatment, sexual abuse, neglect, or other exploitation, which results in harming the child's health, survival, and development (World Health Organization, 1999). Interpersonal childhood adversity is a severe problem in the general

population with many women and men being affected by it (Dube et al., 2005; Glaser et al., 2006; Finkelhor et al., 1990). Previous research has shown that childhood adversity is associated with greater negative affect during times of stress (Infurna et al., 2015; Weltz et al., 2016). This depicts the importance of investigating the relationship between exposure to childhood adversity and negative affective stress reactivity.

The negative affective and stress reactive responses of children exposed to childhood adversity have been associated in previous research. Accordingly, a laboratory study by Wendel et al. (2022) showed that greater adversity during childhood can be linked to greater cortisol (stress hormone) and negative affective reactivity across manipulated conditions. The manipulated conditions consisted of social evaluative threat, participant relative social status, and partner dominance. These conditions were used to closely resemble adverse childhood experiences and to test whether interpersonal stressors influence stress reactivity linked to childhood adversity (Wendel et al., 2022). Furthermore, an Experience Sampling Method (ESM) study conducted by Glaser et al. (2006) showed that childhood adversity has a long-lasting effect on the psychological functions of adults with sexual and physical childhood trauma. Affected individuals continually react with stronger negative emotions toward small stressors during their everyday life (Glaser et al., 2006). Additionally, Heim and Nemeroff (2001) stated that stress during development may increase vulnerability to the effects of stress later in life.

Previous research focused on specific types of adversity (e.g. physical and sexual) (Glaser et al., 2006) but did not consider the whole spectrum. Thus, it is of great importance to investigate the association between all types of childhood adversity and stress reactivity during adulthood. Moreover, besides the ESM study, only a few studies examined this association in a controlled environment.

Emotion Regulation (ER) Strategies

Another factor that plays a potential role in an individual's negative affective reactivity to stress is maladaptive emotion regulation strategies (Krkovic et al., 2018a). Generally, emotion regulation is defined as the processes by which individuals can track, evaluate, and influence the nature, course and expression of emotions (Gross et al., 1998). Developing certain emotion regulation processes throughout childhood and adulthood is crucial for the emergence of distress tolerance (Rudestine et al., 2018). Garnefski & Kraaij (2006) proposed nine cognitive emotion regulation strategies: self-blame, rumination, catastrophizing, other-blame, acceptance, positive refocusing, refocus on planning, putting into perspective, and positive reappraisal. Individuals might use these strategies after being confronted with a negative situation (Kraaij & Garnefski, 2019; Garnefski et al., 2007) such as stressors.

Emotion regulation strategies can be adaptive or maladaptive (Cracco et al., 2015; Garnefski et al., 2007). For this paper, only maladaptive emotion regulation strategies will be addressed. These strategies are response-focused (Tinajero et al., 2020) and can be defined as:

Table 1

Maladaptive ER strategies and their definitions (Domaradzka & Fajkowska, 2018).

Strategy	**Definition**
Self-blame	Blaming oneself for the negative event
Rumination	Repetitive thinking about the thoughts and feelings about the event
Catastrophizing	Focusing on how terrible the event was
Other-blame	Blaming others for what happened

Maladaptive ER strategies can inhibit the downregulation of negative emotions and prolong them (Nolen-Hoeksema, 2012), resulting in serious psychopathology (Garnefski et

al., 2007; Nolen-Hoeksema, 2012). In general, maladaptive ER strategies can become habitual, leading to less coping flexibility, which then results in a higher degree of distress and failure to adaptively cope with situations (Bonanno & Burton, 2013; Rudenstine et al., 2019).

A previous laboratory study by Krkovic et al. (2018a) based on the Trier Social Stress Test (TSST) revealed, that habitual maladaptive ER are predictive of stress response in some cases of the stress indicators. Another ESM study by Krkovic et al. (2018b) indicated that maladaptive ER strategies are associated with stronger negative affect. Further research has examined the link between rumination and stress reactivity and negative affect. Accordingly, Aldao et al. (2014) revealed that rumination is associated with negative affective responses after being confronted with a laboratory-induced stressor. However, there is still little evidence on the relation between maladaptive ER strategies and increased stress reactivity. Previous studies focused on rumination as a specific maladaptive emotion regulation strategy as well as on stress recovery. It appears that only a rare amount of research can be found on the relationship between all types of maladaptive emotion regulation strategies and negative affective reactivity to stress.

Childhood Adversity, Maladaptive ER Strategies and Stress Reactivity

Maladaptive ER strategies have a potentially positive effect on stress reactivity and exposure to childhood adversity increases reactivity to stress (De Calheiros Velozo et al., 2021) and negative affect after a stressor. Additionally, exposure to childhood adversity increases the likelihood of using maladaptive ER strategies (Burns et al., 2010; Cloitre et al., 2011; Farnia et al., 2018; Tinajero et al., 2020; Weltz et al., 2016). In more detail, maltreated children are at a higher risk of emotion dysregulation (Kim & Cicchetti, 2010) by utilizing these strategies while experiencing stressful events (Farnia et al., 2018). People who

developed emotion dysregulation as a child still struggle to regulate their emotions when they are adults (Tinajero et al., 2020; Weltz et al., 2016; Burns et al., 2010).

A study which includes all three of these components and examines the relationship between them might provide more insights into the stress reactivity response of adults who have been maltreated as a child. The association between these components has, however, only been partially studied in previous studies. Therefore, it remains unclear if and to what extent maladaptive emotion regulation strategies can explain the relationship between childhood adversity and negative affective stress reactivity. By examining this interaction between the components, results could be used to improve adults' negative affective reactivity to stress by interventions that help them to cope with their past experiences during their childhood. Additionally, these interventions could help affected adults to learn adaptive ER strategies and to decrease the use of maladaptive ones. Further, mental health programs could help these individuals to better understand their negative affective stress reactivity by explaining the relations between their childhood adversity, maladaptive ER strategies, and stress reactivity.

Present Study

Despite the general findings that childhood adversity, maladaptive ER strategies, and stress reactivity can be associated with each other to a certain extent, it is still unclear whether maladaptive emotion regulation strategies can explain the underlying mechanism of the relationship between childhood adversity and negative affective stress reactivity. For this, the present study aims to investigate whether maladaptive emotion regulation strategies mediate the relationship between childhood adversity and negative affective stress reactivity following a laboratory stress task. In this study, an experimental laboratory stress task is used to measure a stress response and to estimate the participant's negative affective stress reactivity immediately after the stressor. The participants performed the repeated Montreal

Imagining Stress Test (rMIST), a modified version of the MIST, which is used to induce psychosocial stress in the laboratory (De Calheiros Velozo et al., 2021). Based on this, the following research question has been formulated:

> *Research question: To what extent do maladaptive emotion regulation strategies affect the relationship between exposure to childhood adversity and negative affective stress reactivity in adults?*

The following hypotheses have been formulated:

> *Hypothesis 1: Maladaptive emotion regulation strategies lead to a higher negative affective reactivity of stress in adults after a stress task.*
>
> *Hypothesis 2: Maladaptive emotion regulation strategies mediate the relationship between childhood adversity exposure and stress reactivity in adults, such that individuals reporting past experiences of childhood adversity show higher scores on the usage of maladaptive ER strategies and thus, higher levels of stress reactivity after an experimental stressor.*

Methods

The data at hand was collected by De Calheiros Velozo et al. (2021) and will be used for secondary analysis. The original study focused on testing the habituation, sensitization, and anticipation effects of repeated stress induction with help of the repeated Montreal Imaging Stress Test (rMIST) within two studies. The first study consisted of a single-run design by utilizing one stress exposure per session. This study uses the data of the single-run design to investigate the relationship between childhood adversity and negative affect on stress.

Participants

Participants from the general community were recruited via convenience sampling. They were recruited via flyers, which were spread throughout the city, and online. The recruitment criteria consisted of a sufficient level of speaking and reading Dutch as well as being aged between 18 and 35 years. The exclusion criteria consisted of several factors, namely history of endocrine or cardiovascular diseases, chronic or ongoing use of medications, use of illicit drugs in the past three months, allergy to patches, or conductive gels and lastly, working night shifts. Additionally, they read and signed the informed consent beforehand and were rewarded with 30 euros per session. The Sociaal-Maatschappelijke Etische Commissie of KU Leuven granted the ethical approval (De Calheiros Velozo et al., 2021).

Procedure

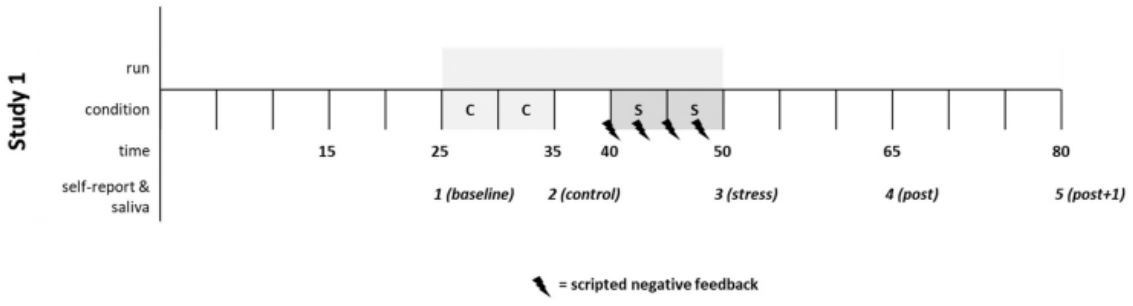
The participants were unaware of the purpose of the study, meaning they were told that the study was about mental effort. They had to complete a baseline questionnaire in 25 minutes within the arrival time of the participants. The questionnaire included demographic items and measurements concerning childhood adversity and emotion regulation strategies. The subsequent testing phase consisted of three parts: the control phase (600 s), a 300-second break, and a stress period (600 s). These three phases were one run. Another questionnaire regarding mood by assessing the participant's negative affect was conducted after the baseline, control, stress, and recovery.

The rMIST was used to induce socio-evaluative stress by assigning arithmetic tasks to the participants and making them feel pressured to perform well (De Calheiros Velozo et al., 2021). The rMIST is a modified version of the MIST. The MIST is a computer program that provides mental arithmetic tasks, a dial to insert solutions, and provides feedback on each submitted solution indicating whether the answer was correct, incorrect, or took too long

('timeout'), as well as two indicators for performance, one for the performance of each participant and one for the average performance (Dedovic et al., 2005). In comparison to the MIST, the rMIST assessed two participants simultaneously by informing them that they were competing against each other. The original performance indicators have been replaced with a bar at the top of the screen, which indicated the participant's and their opponent's performance. This scale was manipulated, meaning that each participant was shown that their counterpart was performing better than themselves (De Calheiros Velozo et al., 2021). The competitive nature of the rMIST was important to trigger the participants into increased mental effort, with their performance being an indicator of their skills and willingness (De Calheiros Velozo et al., 2021). During the stress period, they received scripted negative feedback from the experimenter and were told that their competitor was unexpectedly good and that they will get a new counterpart next time, who better suited their mental effort. This feedback was provided four times during the session. Afterwards, the participants were asked to watch a neutral muted video for an hour in a room. The laboratory sessions took place between 1 pm and 3 pm to reduce the impact of circadian fluctuations (De Calheiros Velozo et al., 2021).

Figure 1

rMIST single-run design



Note. C=control, S= stress, with the arrival time in minutes, the five sample measures of self-reported stress, and the moments where feedback was given. From "The repeated Montreal imaging Stress Test (rMIST): Testing habituation, sensitization, and anticipation effects to repeated stress induction," by J. De Calheiros Velozo, T.

Vaessen, J. Pruessner, I. Van Diest, S. Claes, and I. Myin-Germeys, 2021, Psychoneuroendocrinology, 128 (105217), p. 3. https://doi.org/10.1016/j.psyneuen.2021.105217

Measures

'Childhood Adversity'

To assess whether the adults encountered childhood adversity, the Childhood Trauma Questionnaire (CTQ) was used. This questionnaire consists of 28 items to identify self-reported childhood trauma history. Additionally, the 28 items are divided into five subscales, namely emotional abuse (e.g. *"Felt hated by family"*), physical abuse (e.g. *"Hit hard enough to see a doctor"*), sexual abuse, (e.g. *"Hurt if I didn't do something sexual"*) emotional neglect (e.g. *"Family felt close"*), and physical neglect (e.g. *"Parents were drunk or high"*) (α= .76). The remaining three items are included for a minimization/denial validity scale (Liebschutz et al., 2018; Karos et al., 2014).

The responses are measured on a 5-point Likert scale ranging from "never true" to "very often true" (Liebschutz et al., 2018). Furthermore, each subscale consists of five questions and has a score ranging from 5 to 25 (Table 2). All the items that measured 'emotional neglect' and two items of the subscale 'physical neglect' had to be reverse coded for data analysis.

Table 2

Cut-off scores of the categories

Scores	Trauma exposure categories
5	No exposure
6-10	None to low exposure
11-15	Low to moderate exposure
16-20	Moderate to severe exposure
21-25	Severe to extreme exposure

The study at hand uses ‘Childhood adversity’ as a continuous variable, consisting of the mean scores of each scale. Thus it can be estimated whether higher exposure to childhood adversity has a higher effect on maladaptive ER strategies.

‘Maladaptive ER Strategies’

The Cognitive Emotion Regulation Questionnaire (CERQ) is used to identify the cognitive emotion regulation strategies individuals use after being confronted with a negative situation or experience. The CERQ consists of 36 items and is a self-report-based questionnaire. These 36 items are divided into nine subscales, namely self-blame, acceptance, focus on thought/rumination, positive refocusing, refocus on planning, positive reappraisal, putting into perspective, catastrophizing, and blaming others (Garnefski & Kraaij, 2006). The items are being measured with a 5-point Likert scale ranging from 1 ((almost) never) to 5 ((almost) always). The nine subscales are measured by summing up the item scores of each subscale (ranging from 4 to 20). Thus, the higher each score, the more the cognitive strategy is used (Garnefski & Kraaij, 2006). The nine subscales can be divided into maladaptive and adaptive emotion regulation strategies (Table 3).

Table 3

The division of the nine subscales based on maladaptive and adaptive strategies (Domaradzka & Fajkowska, 2018)

Maladaptive Strategies	**Adaptive Strategies**
Self-blame	Acceptance
Rumination	Positive Refocusing
Catastrophizing	Refocus on planning
Other blame	Putting into perspective
	Positive Reappraisal

Thus, it can be determined if someone is more likely to use adaptive strategies or maladaptive strategies based on their scores for each scale. For this study, adaptive ER

strategies are not highlighter further. The measure 'Maladaptive ER Strategies is composed of the subscales: self-blame (e.g. *"I think that I have been stupid")*, focus on thought/rumination (e.g. *"Again and again, I think of how I feel about it"*), catastrophizing (e.g. *"All the time, I think that this is the worst thing that can happen to you"*) and blaming others (e.g. *"I think that it's the fault of others"*). The Cronbach's Alpha was acceptable but not high (α = .68). Thus, an inter-item correlation was computed. The correlation revealed that 'self-blame' had the lowest item-total correlation (α = .31) and deleting it would lead to a Cronbach's Alpha of α= .71. However, deleting this item did not show more significant results in the mediation analyses and the measure already consists of only a small number of items. That is why it was decided to include 'self-blame' in further analyses.

'Negative Affect (NA) Stress Reactivity'

During the session, the participants were asked to complete a self-reported questionnaire to assess negative affect. The items were scored on a 7-point Likert scale ranging from 1 (not at all) to 7 (extremely). The measure consisted of the following two mood items "at the moment I feel down" and "at the moment I feel annoyed". The scale demonstrated a Cronbach's alpha of .61. To estimate a person's negative affective stress reactivity a new variable had to be computed by subtracting the average of the NA items of the control condition from the average NA items of the stress condition. Higher scores indicated higher stress reactivity.

Data Analysis

The data were analysed with the software IBM SPSS, version 25. First, the two datasets, lab questionnaires and baseline questionnaires have been merged into one dataset and the variables irrelevant to the study were deleted. Participant 55 had to be deleted from the dataset due to being too large of an outlier. Additionally, p values < 0.05 were considered statistically significant. After the dataset has been prepared and the necessary items have been

recorded, the descriptives and frequencies of the demographics and the frequencies of the childhood adversity subscales have been calculated. The descriptives (M, SD, Minimum, and Maximum) were computed for the dependent variables. Afterwards, to investigate the associations between the dependent variables, bivariate correlation analyses were computed for the total sample. For all analyses 'Childhood Adversity' and 'Maladaptive ER strategies' were used as the independent variables, 'NA Stress Reactivity' as the dependent variable and gender and age were used as the controlling variables.

Mediation Analysis

Prior to the mediation analysis, a power analysis was run with the G*Power program. To know whether 'maladaptive ER strategies' played a role as a mediator between the relationship of 'childhood adversity' with 'negative affect stress reactivity', mediation-in-serial models using multiple regressions were computed. The mediation effect describes the indirect effect of the independent variable (IV) on the outcome variable (DV) through the intervening variables, the mediator (MV) (Pereira-Morales et al., 2019). A perfect complete mediation occurs when the effect of IV on DV decreases to zero with the inclusion of MV. A partial mediation occurs when the effect of IV on DV decreases by a nontrivial amount, but not to zero (Preacher & Hayes, 2004). Furthermore, there should be no measurement error for MV and DV should not cause MV (Preacher & Hayes, 2004). These four assumptions need to be met to state a mediation effect.

'Childhood Adversity' was inserted as an IV, 'Negative Affect Stress Reactivity' as the DV and 'Maladaptive Emotion Regulation Strategies' was inserted as the mediating variable (MV). To calculate the direct effects, indirect effects, total effects, the bias-correlated bootstrapped standard errors (1000 repetitions) and the 95% confidence interval, model 4 of the PROCESS macro plugin for SPSS was used (Hayes, 2017). Afterwards, a Sobel test was conducted to see whether there is a mediation effect on the overall model.

Results

Descriptives

In Table 4, the descriptives of the dependent variables are displayed. Table 5 shows the frequencies of the subscales depending on exposure to childhood adversity.

Table 4

Descriptive Statistics of the dependent Variables (N=52)

	N	Minimum	Maximum	Mean	Std. Deviation
Maladaptive ER strategy	52	4.00	17.00	9.29	2.50
Childhood Adversity	52	5.00	14.60	7.18	2.42

Four people did not experience exposure to childhood adversity, whereas 48 participants did. Note that there was a moderate bivariate correlation between ‘maladaptive ER Strategies’ and ‘Childhood Adversity’, (r= .33, $p< .05$). The dependent variables were positively correlated with each other. A strong correlation between maladaptive emotional regulation strategies and childhood adversity $r(52) = .33$, $p< .05$ was found.

Table 5

Frequencies of the subscales depending on exposure to childhood adversity (N=52)

	Physical abuse	Emotional abuse	Sexual abuse	Physical neglect	Emotional neglect
Exposure	9 (17.31%)	36 (69.23%)	8 (15.38%)	20 (38.46%)	44 (84.62%)
No Exposure	43 (82,69%)	16 (30.77%)	44 (84.62%)	32 (61.54%)	8 (15.38%)

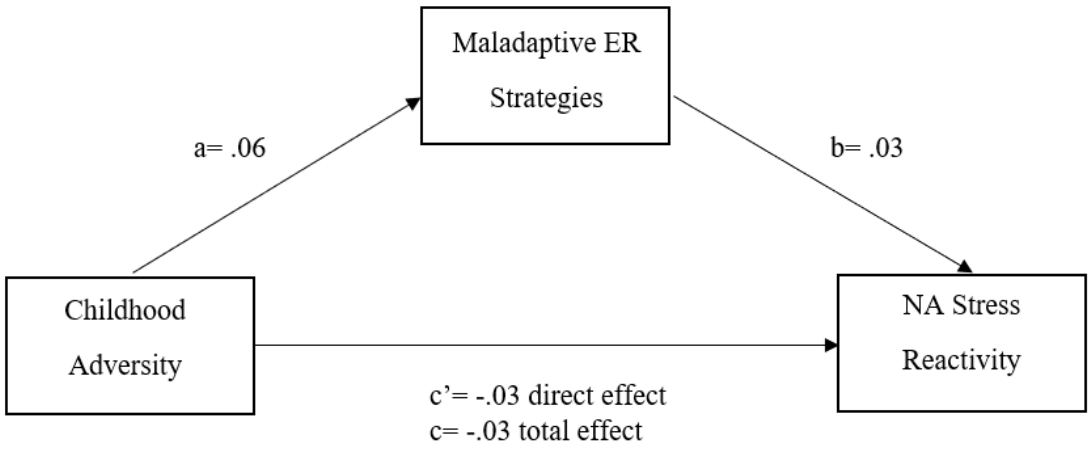
The results of the frequency analysis show that emotional neglect is most frequent (84.62%), followed by emotional abuse (69.23%), physical neglect (38.46%), physical abuse (17.31%), and lastly by sexual abuse (15.38%).

Mediation Analysis

The power analysis showed that the total sample size needs to be 68 for total power. For 'NA Stress Reactivity', 'Maladaptive ER Strategies' has not been a significant mediator (Fig. 2). A non-significant total effect between childhood adversity and negative affect stress reactivity was found (B= -.03, *p*= .07), and path a (childhood adversity on maladaptive emotion regulation strategies) (B=.06, *p*= .03) was significant, however, path b (maladaptive emotion regulation strategies on negative affect stress reactivity) was non-significant as well (B= .03, *p*= .71). The direct effect was non-significant (B= -.03, *p*= .07). Furthermore, there was no significant indirect effect of the degree of exposure to childhood adversity on the negative affective of stress reactivity through the usage of maladaptive emotion regulation strategies, *b*= -.03, BCa CI [-.06, .00]. Hence, the 95% confidence interval includes a zero, the mediation effect has to be rejected. The Sobel-Test did not show significant results as well. Additionally, age and gender were used as the covariates. However, both variables did not show any significant effects on the variables and the mediation.

Figure 2

Simple mediation model for negative affect stress reactivity



Note. a = The effect of the independent variable on the mediator variable. b= The effect of the mediator variable on the outcome variable. c'= Total effect of the dependent variable on the outcome variable. c= Direct effect of the dependent variable on the outcome variable.

Post-hoc Analysis

Mediation analysis with 'Adaptive ER Strategies' and one with 'Maladaptive ER Strategies' and 'Adaptive ER Strategies' combined as the mediators were conducted afterwards. Therefore, a new measure, 'Adaptive ER Strategies', had to be computed. The measure 'Adaptive ER Strategies' is composed of the subscales: acceptance (e.g. *"It just happened, there is nothing I can do about it"*), positive refocusing (e.g. *"I think of nice things that have happened to me"*), refocus on planning (e.g. *"I think of how I can cope with it"*), positive reappraisal (e.g. *"I think that I can learn from it"*), and putting into perspective (e.g. *"I think that it's not as bad as other things that could happen"*). The Cronbach's Alpha was α= .80.This was done since the first mediation analysis did not find a significant mediation effect, thus it was tested whether the other ER strategy combinations would. This post-hoc analysis was run because some people, who were exposed to childhood adversity, might engage in adaptive ER strategies, or a combination of both, instead of maladaptive ones. Therefore, it was suggested that these might show significant effects. Both analyses were not significant as well. Accordingly, they are not taken into further consideration.

Discussion

To the best of my knowledge, this is the first study that focused on the association between childhood adversity and negative affective stress reactivity, and whether maladaptive ER strategies can explain the underlying mechanism of this association, following a laboratory stress task (rMIST). Results indicated that exposure to childhood adversity is associated with maladaptive ER strategies. Childhood adversity did not predict negative affective reactivity to stress, and maladaptive ER strategies were not found to significantly mediate the relationship between childhood adversity and negative affective stress reactivity.

Childhood Adversity Affecting Usage of Maladaptive ER Strategies

According to the results, childhood adversity is associated with maladaptive ER strategies, meaning they are more likely to use maladaptive ER strategies. This is in line with several previous studies (Burns et al., 2010; Miu et al., 2022; Tinajero et al., 2020; Weltz et al., 2016). A previous study suggests that women, who have a history of sexual, physical, and emotional abuse, show greater difficulties regarding their emotion regulation (Burns et al., 2010).

A possible explanation might be the fact that childhood adversity often consists of abuse or neglect from their caregivers as well as experiencing violence at home. This results in children being less likely to learn how to label their emotions and expressions, and regulate their behaviour since these skills are not being modelled by their caregivers (Cross et al., 2017). Accordingly, these children might be at risk to learn to inappropriately regulate their emotions.

The Mediating Role of Maladaptive ER Strategies

The hypothesized indirect effect of childhood adversity on negative affective stress reactivity was not supported by measures of maladaptive ER strategies. Furthermore, the direct and total effects which childhood adversity has on negative affective stress reactivity are non-significant. Laboratory studies that investigated the association between childhood adversity and stress reactivity, with maladaptive ER strategies being the mediator, in the general population are lacking.

The discrepancy in findings might be due to the use of different methodologies. One study, that appears to be the most similar to the present study, investigated whether emotion regulation would mediate the association between self-reported childhood adversity and adult psychological distress (Rudenstine et al., 2019). The researchers suggested that emotion regulation plays a mediating role in this association. However, Rudenstine et al.

(2019) focused on difficulties with emotion regulation, instead of considering maladaptive emotion regulation strategies, conducted their research with patients from a mental health clinic, and lastly used self-reported measures of psychological distress instead of inducing stress in a laboratory. Additionally, the findings deviate from the present findings due to using different measures. The DERS is considered a construct which is a competency-focused model regarding emotion regulation, whereas the CERQ focuses on assessing specific cognitive and behavioural strategies in response to negative events (Zelkowitz & Cole, 2016).

Further research, that was not based on a laboratory approach, found that the indirect effect of childhood adversity on psychopathology was supported by the habitual use of typical maladaptive ER strategies (Miu et al., 2022). Results from an ESM study show, that childhood adversity is positively associated with an increase in emotional reactivity to daily stressors in adults (Glaser et al., 2006), meaning that individuals lastingly and continually portray stronger negative emotions when being confronted with a small stressor (Glaser et al., 2006).

Another potential factor that plays a role in the discrepancy, is that researchers have focused on single emotion regulation strategies in particular. This may grant different results because some strategies might weigh more than others. For example, there have been several explorations on rumination (D'Avanzato et al., 2013; Hilt & Pollak, 2013; Miu et al., 2022) but rather less on the other maladaptive ER strategies. It is suggested that rumination yields the greatest positive effect on negative affect compared to the other maladaptive ER strategies (Aldao et al., 2014; D'Avanzato et al., 2013). A few studies showed that there is a positive association between self-blame and cortisol output to a stressor (Janson & Rohleder, 2017; Turner-Cobb et al., 2019), however, more research on this association is needed. Future

research also needs to examine whether the other strategies have the same impact as rumination.

Lastly, the power issue could be a possible explanation for non-significant results. Before the mediation analysis, a power analysis was run which determined that the total sample size should consist of 68 participants. However, the study at hand had only 52 participants, which might have influenced the results of the mediation analysis.

Frequencies of Types of Childhood Adversity

The results indicate that the majority (91.67%) of this laboratory sample reported experience of childhood adversity. While this prevalence rate is high, it is consistent with the findings of previous studies. Corbin et al. (2013) found that 100% of their participants experienced at least one adverse event during their childhood and 81.3 % experienced two or more. The prevalence in this study might be high because every person that indicated a score higher than 1 on at least one question was assigned to the exposure group. This approach was chosen because there was only data from self-reported questionnaires measured with a Likert-scale, thus there was no room for further explanation on whether the person would classify their experience as adverse. That is why the prevalence of exposure might decrease if the participants have the opportunity to evaluate their childhood as either adverse or not.

The study at hand differentiated between the frequencies of the subscales of childhood adversity and found evidence that emotional neglect has been the most frequent among the sample, followed by emotional and physical abuse. The study of Stoltenborgh et al. (2014) also portrayed the highest frequencies for these three subscales among the continents.

Theoretical Contributions

The findings of this study suggest that many adults have experienced at least one type of childhood adversity and that this experience has an impact on the likelihood of using

maladaptive ER strategies. This has important implications for mental health interventions in childhood adversity. Interventions could target emotion regulation in children to prevent them from developing psychopathology later in life. For example, trauma-focused cognitive behavioural therapy consists of methods that help children to focus on relaxation, identify and label their emotions, and learn how to effectively modulate their emotions (McLaughin et al., 2014). Gaining skills such as cognitive reappraisal and engaging in problem-solving training can be highly efficient in reducing psychopathology (McLaughin et al., 2014). Hilt & Pollak (2012) found that distraction and mindfulness help to reduce rumination. As emotional neglect and emotional abuse have been the most frequent among the participants, interventions and therapy should be adjusted to target these types of childhood adversity. Grossman et al. (2017) present Component-Based Psychotherapy (CBP), which consists of four components, namely relationship, regulation, and dissociative parts. This approach seems to be especially suited for individuals who experience these two types of adversity because victims were found to have difficulties in establishing and maintaining safe and healthy relationships, are more affected by a negative self-image, worth, or esteem, and are more prone to internalizing distress, as well as to engage in more maladaptive coping compared to victims of other traumas (Grossman et al., 2017).

Limitations and Implications for the Future

This study had several limitations. First, the sample size was rather small for the total population and the power analysis suggested a higher sample size (68 participants) to be granted powerful results. Thus, the results of the analyses should be considered carefully.

The study depicted the distribution of participants who have been exposed to childhood adversity and participants who have not been exposed. This distribution of the two groups was made by assigning each person, that indicated a two on at least one item of the CTQ, to the exposure group. Thus, everyone with an overall score higher than 25 was

categorized as having experienced childhood adversity. Based on this, one group contained only four participants and the other contained 48 participants, thus the comparison is not representative. To circumvent non-significant results, both sample sizes must be larger.

Additionally, this study focused on childhood adversity and maladaptive emotion regulation strategies as a construct and not on specific types (e.g. on rumination). This might have resulted in non-significant outcomes. This approach is highly critical because it leads to the assumption that each type of childhood adversity weighs the same as well as it is limited to the co-occurrence of these types. For future research, it would be of great interest to focus on each subscale of the adversities separately and to take the subscales of emotion regulation strategies separately into consideration. Depending on what type of adversities one faces, different maladaptive emotion regulation strategies may be used (Turner & Butler, 2003). Furthermore, it needs to be explored whether different outcomes may result from the time of onset, the duration of exposure and the severity of adverse events.

Moreover, gender has not been distributed equally either (48 women and eight men), which might have affected the results as well. This might be because men and women experience different traumas during their childhood (e.g. women are at a higher risk to encounter sexual trauma whereas men are more likely to experience physical abuse) (Glaser et al., 2006), which has not been taken into consideration. A possible reason for this unequal distribution was suggested by Strine et al. (2012) namely that women might be more willing to report their exposure to childhood adversity. Additionally, Burns et al. (2010) suggested that maltreated women show greater difficulties regarding their emotion regulation compared to non-maltreated women. Due to the fact, that the majority of the participants of this study were female, the results might show a stronger positive association than they would have with equal distribution. It needs to be further investigated whether this positive association can be attributed to maltreated men as well. The current study did not investigate gender

differences. Therefore, the results of the current study are representative of women but rather less for men.

Lastly, the data that was used for this study was gathered in a laboratory setting by inducing stress via socio-evaluative stress (De Calheiros Velozo et al., 2021). It is therefore possible that participants might behave differently in everyday life and respond to different types of stressors. It is, therefore, necessary to conduct future research on different stressors as well, as some people may be more sensitive to personal stressors than to socio-evaluative stressors.

Conclusion

In total, the results of this study reveal that childhood adversity increased the usage of maladaptive ER strategies and that the majority of the participants were affected by childhood adversity. By estimating the frequencies of the childhood adversity types, emotional neglect, emotional abuse, and physical abuse were identified as the three most frequent adversities. Additionally, the slightly non-significant effects of the mediation analysis leave room to speculate whether these three variables might yield an indirect effect under different conditions (e.g. sample size). There is evidence that many people have been exposed to childhood trauma and that it harms their emotional regulation system and their strategies for coping with emotions. Almost every participant experienced at least one form of adversity during their upbringing. It became clear that childhood adversity is closely linked using maladaptive emotion regulation strategies. Contradicting all expectations, maladaptive emotion regulation strategies and childhood adversity did not affect stress reactivity. Previous research has found that exposure to childhood trauma affects someone's stress reactivity later in life. Therefore, each component seems to influence the other, nonetheless, a mediation effect could not be found. This is something future research should particularly focus on to determine why they influence each other but not to the extent of maladaptive ER strategies

being able to explain the underlying mechanisms of the relationship between childhood adversity and negative affective stress reactivity in adults. Understanding the relationship between these three components can help to better understand adults' reactions to stress and help them cope with it. Additionally, psychological interventions can be adjusted to target each type of childhood adversity and thus, help the affected individuals to better regulate their emotions.

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