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Does Emotion Dysregulation Mediate the Relationship between Early Maltreatment and Later Substance Dependence? Findings of the CANSAS Study

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Key Words

Emotion dysregulation · Early maltreatment · Substance use disorders · Mediation · Training of emotion regulation strategies

Abstract

Background/Aims: Maltreatment in childhood and adolescence is a risk factor for substance use disorders (SUDs) in adulthood. This association has rarely been investigated in the light of emotion dysregulation. To fill this gap, this study examines emotion dysregulation and SUDs among adults with a history of early maltreatment. **Methods:** Comparison of emotion dysregulation in adults with a history of early abuse and neglect who developed either an SUD ($n = 105$) or no mental disorder ($n = 54$). Further, a mediation model for the association between the severity of early maltreatment and SUDs was tested. Participants completed research diagnostic interviews for psychopathology, the Difficulties in Emotion Regulation Scale, and the Childhood Trauma

Questionnaire. **Results:** By using hierarchical regression techniques and mediational analyses controlling for age and gender, it was possible to provide evidence for the mediating role of emotion dysregulation between early emotional and physical maltreatment and later SUDs. **Conclusions:** Emotion dysregulation is a potential mechanism underlying the relationship between early emotional and physical maltreatment and the development of SUDs. In light of these findings, focusing on the early training of adaptive emotion regulation strategies after childhood maltreatment might be of considerable relevance to prevent the development of SUDs.

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Introduction

To date, a considerable body of studies suggests that a multitude of patients with substance use disorder (SUD) experienced severe maltreatment in childhood or adolescence, including experiences of emotional and physical neglect as well as emotional, physical and sexual abuse [1–4]. Early maltreatment may lead to alcohol or drug consumption in order to deal with disturbing memories, hyperarousal or other trauma-related sequelae [5]. Building on these findings, a mediating role of difficulties in dealing with negative emotions could be expected in the link between traumatic experiences and substance use. And indeed, emotion dysregulation has been shown to be a consequence of both childhood abuse and neglect [6] and associated with and predictive for substance misuse and SUDs [7, 8].

Early Maltreatment and Its Association with SUDs

In general, early maltreatment shows associations to problematic use of a wide range of substances. A multitude of studies provides evidence that maltreatment in childhood and adolescence is related to subsequent substance use (for reviews, see [9, 10]), independent of sociodemographic variables and even in the absence of other Axis I and Axis II disorders [1]. However, traumatic experiences take a variety of forms, ranging from emotional or physical neglect to emotional, physical or sexual abuse, which differ in their influence on substance use [4]. In sexual abuse cases, a ‘dose-response’ relationship was found for severity of sexual abuse and the risk for developing alcohol dependence [11], whereas, less is known about ‘dose-response’ relationships regarding types of maltreatment other than sexual abuse. Similar to sexual abuse, we expect a positive association between the severity of emotional and physical maltreatment and the risk for developing SUDs.

Early Maltreatment and Its Impact on Emotion Dysregulation

Another factor that has received increasing attention in the context of maltreatment is emotion dysregulation [12, 13]. In accordance with Gratz and Roemer [14], emotion dysregulation is defined as a multifaceted construct that refers to maladaptive ways of reacting to the one’s own emotional experience, like difficulties to control behavioural impulses or a lack of access to adaptive emotion regulation strategies. Development of emotion regulation and dysregulation, respectively, is sensitive to individual influences, especially in childhood and adolescence, when

cognitive and emotional maturation proceed faster than in any other time of life [15]. Exposure to early maltreatment can therefore lead to early emotion regulation difficulties or to emotion dysregulation in later life [6, 16]. In particular, interpersonal and chronic trauma is assumed to have a harmful effect on the development of adaptive emotion regulation [17, 18]. However, several findings indicate that sexual abuse affects emotion regulation in a different manner than the other kinds of maltreatment mentioned above [19–21].

Emotion Dysregulation and Its Impact on SUDs

Affective processes play a crucial role in substance use [22]. First, substance use can serve as an emotion regulation strategy itself by altering one’s emotional state pharmacologically. A majority of substances will increase positive emotions and alleviate negative emotional states (e.g. [22, 23]). Second, deficits in emotion regulation are a risk factor in the development of SUDs. For example, a longitudinal study, following 1,000 individuals from their birth to age 32, found that early deficits in self-control dimensions associated to emotion regulation, like affective lability, low frustration tolerance and impulsivity, were significantly predictive for substance dependence in adulthood [24]. Third, deficits in emotion-regulation strategies are also seen as core elements in current SUDs. For example, deficits in emotion regulation skills are associated with higher drug consumption [25] and conversely individuals with SUD report poorer emotion regulation skills than healthy controls [26]. Therefore, SUDs have repeatedly been conceptualized as disorders of emotional regulation (e.g. [8, 27]).

The Mediating Role of Emotion Dysregulation and the Present Study

The findings mentioned above underline the idea that emotion dysregulation has a mediating role between early maltreatment and substance use. This has been supported by a study in an SUD sample so far, where childhood emotional and physical abuse were associated with emotion dysregulation [21], while other studies found that different aspects of emotion dysregulation, like impulse control difficulties, mediate childhood maltreatment and psychopathology [28, 29]. However, there are limitations to these studies, including the common use of college samples instead of clinical or exclusively traumatized samples or the examination of only single subscales of emotion dysregulation. Building on the results of prior studies, this investigation examines whether or not emotion dysregulation mediates the relationship between se-

verity of maltreatment and presence of SUDs. The study aims to contribute to the existing body of basic addiction research while exploring potential developmental trajectories for psychopathology after early maltreatment. Findings of the current study have the potential to provide therapeutic approaches to prevent the development of addiction due to childhood traumatization and to provide a deeper understanding of underlying processes of this association.

Methods

Procedure

Data was collected as part of the ongoing multicenter study Childhood Abuse and Neglect as a cause and consequence of Substance Abuse – understanding risks and improving Services (CANSAS) [30], funded by the German Federal Ministry of Education and Research. All participants were recruited by trained psychologists. Individuals in the SUD group were recruited at drug rehabilitation centers and therapy facilities in the areas of Heidelberg, Hamburg and Cologne, Germany. Those in the mentally healthy study group (MH group) were recruited via advertisements in daily newspapers and public institutions. At the first appointment, inclusion and exclusion criteria were verified and participants were assigned to one of the 2 study groups. Inclusion criteria for both groups were (a) the presence of emotional, physical or sexual maltreatment in childhood or adolescence and (b) the absence of the following exclusion criteria: current neurological disorder, psychotic disorder, acute suicidality and substance use within the last 2 weeks [31]. An additional inclusion criterion for the SUD group was the presence of substance dependence (alcohol, illicit drugs or medication) within 12 months prior to study participation. At a second appointment, semi-structured interviews for major mental disorders and posttraumatic experiences were conducted. Comprehensive questionnaires, including those regarding emotion dysregulation, were completed between the first and second appointment. All procedures were approved by the Ethics Committee of Ruprecht-Karls-University Heidelberg, Germany.

Participants

A total of 166 individuals were screened. Seven participants were excluded from analyses for not fulfilling criteria for at least moderate to severe emotional, physical or sexual maltreatment, according to the Childhood Trauma Questionnaire (CTQ) [32], resulting in a final sample of 159 participants. The SUD group consisted of 105 individuals with a history of maltreatment who met criteria of alcohol or drug dependence according to DSM-IV within the last 12 months. All participants had been abstinent at least 2 weeks prior to their study participation to limit the influence of potential withdrawal symptoms. Among all investigated participants in the SUD group, maltreatment occurred before the first development of an SUD. The SUD group was predominantly male (68.6%) and ranged in age from 19 to 58 (mean 38.64, SD 10.52). The MH group consisted of 54 individuals with a history of maltreatment and no current or lifetime Axis I disorder. In this group, 22.2% were male with an age range of 19 to 65 (mean 36.56,

SD 13.59). Groups did not differ in terms of age ($t = 0.99$, $p = 0.327$), but differed in terms of gender ($\chi^2 = 30.74$, $p < 0.001$, $\phi = 0.440$).

Measures

Maltreatment

The German version of the CTQ-Short Form [32–34] was used to assess maltreatment in childhood and adolescence. The questionnaire is composed of 5 subscales retrospectively measuring experiences of emotional neglect, physical neglect, emotional abuse, physical abuse and sexual abuse. In the present sample, Cronbach's α was 0.65. Without the scale for sexual abuse, Cronbach's α increased to 0.81; hence, a maltreatment mean score of the 4 subscales of emotional and physical maltreatment was created, with higher values indicating higher experience of maltreatment. Additionally, the questionnaire was supplemented by items to assess the temporal classification of maltreatments. The construct validity of the CTQ has been shown [34] and also been confirmed in patients with SUDs [35].

Emotion Dysregulation

The Difficulties in Emotion Regulation Scale (DERS) [14] was used in its German translation [36]. It is a self-report measure assessing emotion dysregulation on the dimensions of [1] nonacceptance of emotional responses [2], difficulties engaging in goal-directed behaviour [3], impulse control difficulties [4], lack of emotional awareness [5], limited access to emotion regulation strategies [6], and lack of emotional clarity. Different research groups supported the adequacy of a 5-factor model of the DERS where the awareness scale is excluded [37, 38], which shows a low correlation with the other factors. Building on these findings, we used a latent DERS variable for our mediation model, including the 5 aforementioned subscales. Due to high modification indices, we added a covariation for the subscales difficulties engaging in goal-directed behaviour and impulse control difficulties (0.34). This model reached a good fit ($\chi^2 = 4.30$, d.f. = 4, $p = 0.366$, CFI = 1.00, RMSEA = 0.023 (90% CI 0.000–0.129)).

Substance Dependence and Other Psychopathology

The presence of alcohol and drug dependence in the past 12 months was generated as a dichotomous variable from the German research version of the Structured Clinical Interview for DSM-IV Disorders (SCID-I) [39]. Further, the age of onset and the duration of SUD was also assessed. The SCID-I was further used to assess other current or lifetime mental disorders (with the exception of somatoform and adjustment disorders). All interviews were conducted by trained psychologists and the outcomes were verified in case conferences.

Statistical Analysis

To identify group differences for those with and without substance dependence regarding their maltreatment history and their emotion dysregulation, we performed multivariate analyses of variance. Adjusted t statistics were used in the case of inhomogeneity of variance. Effect sizes were calculated as mean differences divided by the SD of the MH group. Further, associations of emotion dysregulation and different types of maltreatment, as well as the CTQ mean score, were assessed using Pearson product-moment correlations. These data analyses were performed using IBM SPSS Statistics 22.0.0. The mediating effects of emotion dysregulation were verified using IBM SPSS Amos 22.0.0.

Table 1. Maltreatment severity and maltreatment occurrence in participants with and without substance use disorder

| | SUD group (n = 105), mean (SD)/% | MH group (n = 54), mean (SD)/% | Statistic |
|---|-------------------------------------|-----------------------------------|--|
| Emotional neglect ^a | 17.86 (4.23) | 15.37 (4.99) | t = 3.30, p = 0.001, 95% CI (1.00 to 3.98), d = 0.50 |
| Physical neglect ^a | 13.15 (4.44) | 9.81 (3.85) | t = 4.69, p < 0.000, 95% CI (1.93 to 4.74), d = 0.87 |
| Emotional abuse ^a | 17.30 (5.12) | 14.13 (5.14) | t = 3.69, p < 0.000, 95% CI (1.47 to 4.86), d = 0.62 |
| Physical abuse ^a | 13.60 (6.26) | 9.37 (4.50) | t = 4.89, p < 0.000, 95% CI (2.52 to 5.94), d = 0.94 |
| Sexual abuse ^a | 9.62 (6.20) | 11.57 (6.42) | t = -1.86, p = 0.065, 95% CI (-4.03 to 0.12), d = 0.30 |
| Maltreatment mean score ^a | 14.30 (3.59) | 12.05 (3.01) | t = 3.95, p < 0.000, 95% CI (1.13 to 3.38), d = 0.75 |
| Occurrence of at least moderate to severe, (in %) | | | |
| Emotional neglect ^a | 78.1 | 61.1 | $\chi^2 = 5.14$, p = 0.023, $\phi = 0.180$ |
| Physical neglect ^a | 78.1 | 46.3 | $\chi^2 = 16.38$, p = 0.000, $\phi = 0.321$ |
| Emotional abuse ^a | 84.8 | 61.1 | $\chi^2 = 11.17$, p = 0.001, $\phi = 0.265$ |
| Physical abuse ^a | 69.5 | 38.9 | $\chi^2 = 13.85$, p = 0.000, $\phi = 0.295$ |
| Sexual abuse ^a | 45.7 | 63.0 | $\chi^2 = 4.25$, p = 0.039, $\phi = -0.163$ |

^a Assessed with CTQ.

Table 2. Zero order correlations for severity of maltreatment and emotion dysregulation (n = 159)

| | Emotional neglect ^a | Physical neglect ^a | Emotional abuse ^a | Physical abuse ^a | Sexual abuse ^a | Maltreatment mean score ^a |
|----------------------------|--------------------------------|-------------------------------|------------------------------|-----------------------------|---------------------------|--------------------------------------|
| Nonacceptance ^b | 0.09 | 0.18* | 0.28** | 0.18* | 0.11 | 0.25** |
| Goal ^b | 0.07 | 0.25** | 0.21** | 0.21** | -0.01 | 0.21** |
| Impulse ^b | 0.12 | 0.34** | 0.23** | 0.29** | 0.02 | 0.28** |
| Strategies ^b | 0.19* | 0.25** | 0.32** | 0.30** | -0.08 | 0.34** |
| Clarity ^b | 0.18* | 0.33** | 0.23** | 0.19* | -0.05 | 0.25** |

Assessed with ^a CTQ, ^b DERS. * p < 0.05, ** p < 0.01.

Results

Comparison of Maltreatment in the 2 Study Groups

Table 1 shows the severity of traumatic experiences for the 2 study groups, indicating significantly more severe maltreatment for participants in the SUD group regarding the 4 out of 5 investigated types of trauma, namely, in case of emotional and physical neglect as well as emotional and physical abuse. Sexual abuse occurred significantly less often in the SUD group. Participants of the SUD group experienced a mean of 3.56 (SD 1.24) different types of maltreatment versus a mean of 2.70 (SD 1.41) types of maltreatment in the MH group. Only 14.5% of participants experienced one type of maltreatment, while 21.4% of the participants experienced all 5 types.

Correlation of Maltreatment and Emotion Dysregulation

Zero order correlations in table 2 show significant associations between the intensity of physical neglect, emotional abuse, physical abuse, the maltreatment mean score and the extent of difficulties in emotion regulation on the 5 subscales. Further, more severe emotional neglect was associated with a more limited access to emotion regulation strategies and a greater lack of emotional clarity. There was no association between sexual abuse and any of the DERS subscales.

Emotion Dysregulation and Substance Use

Figure 1 presents the results of the comparison of emotion dysregulation in both groups. Participants with a history of early maltreatment and an SUD displayed signifi-

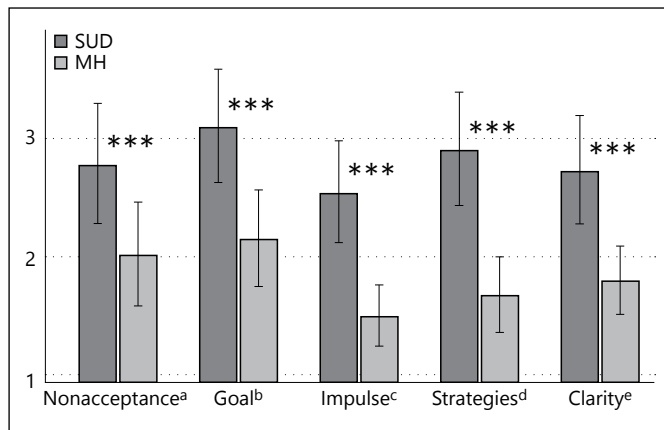


Fig. 1. Emotion dysregulation in participants with and without SUD. $n = 159$. Assessed with DERS. ^a Nonacceptance of emotional responses, ^b difficulties engaging in goal-directed behavior, ^c impulse control difficulties, ^d limited access to emotion regulation strategies, ^e lack of emotional clarity. *** $p < 0.001$.

cantly higher values on all DERS subscales than those with a history of early maltreatment and no mental disorder. Precisely, controlled for gender, this was the case for nonacceptance of emotional responses ($F(1,156) = 31.93$, $p < 0.001$), difficulties engaging in goal-directed behaviour ($F(1,156) = 37.61$, $p < 0.001$), impulse control difficulties ($F(1,156) = 61.25$, $p < 0.001$), limited access to emotion regulation strategies ($F(1,156) = 75.45$, $p < 0.001$) and lack of emotional clarity ($F(1,156) = 42.48$, $p < 0.001$).

There was no significant association between the age at onset of SUD and any of the investigated DERS subscales ($p > 0.05$), or between the duration of SUD and the DERS subscales ($p > 0.05$).

Mediation Model of the Relationship between Maltreatment and SUD

Figure 2 presents a mediation model for the association between the severity of childhood maltreatment and the presence of SUD. Because of the lack of association between sexual abuse and any kind of emotion dysregulation as well as the negative association to the occurrence of SUD, these analyses were performed with the maltreatment mean score, without the scale for sexual abuse. Accordingly, 13 individuals who experienced only sexual abuse were excluded from these analyses. Path estimates indicate that greater severity of early maltreatment is associated with increased incidence of an SUD, while controlling for the influence of age on reported maltreatment severity and gender on the presence of SUD (paths not

shown). When testing the model without emotion dysregulation, the association between severity of maltreatment and presence of SUD was significant ($p = 0.009$). However, this changes after including emotion dysregulation as a mediator ($p = 0.283$). Further, the indirect effect mediated through emotion dysregulation reached significance ($b = 0.016$, $p = 0.002$ (90% CI 0.017–0.037)). To summarize, the path model shows that the relationship between severity of maltreatment in childhood and adolescence and SUD is fully mediated by emotion dysregulation.

The maltreatment mean score was selected to depict early maltreatment in the path model, because most participants reported more than one maltreatment as well as the high intercorrelations between the CTQ subscales. However, the complete model can also be considered fitting with the CTQ subscales for physical neglect and emotional and physical abuse fig. 3.

Discussion

The aim of this study was to provide an investigation of the mediating role of emotion dysregulation in the relationship between early maltreatment and SUDs. Consistent with this proposed model, we found that emotion dysregulation mediated the relationship between the severity of emotional and physical maltreatment and later SUDs, suggesting that the latter are associated through their associations with 5 dimensions of emotion dysregulation (nonacceptance of emotional responses, difficulties engaging in goal-directed behaviour, impulse control difficulties, limited access to emotion regulation strategies, and lack of emotional clarity). Precisely, we found that individuals with more severe experience of maltreatment in childhood and adolescence reported more maladaptive emotion regulation. Simultaneously, higher emotion dysregulation increased the risk of developing an SUD. These findings are in line with past investigations of emotion dysregulation as a mediator of the relationship between maltreatment and different aspects of psychopathology [28, 29, 40]. The findings are further in line with studies on individuals without traumatization, where aspects of emotion regulation were identified as resilience factors [41].

Maltreatment was not only associated with SUDs but also with emotion dysregulation. We found a positive relationship between physical neglect, emotional abuse and physical abuse and all investigated aspects of emotion dysregulation. Our results replicate the finding that sev-

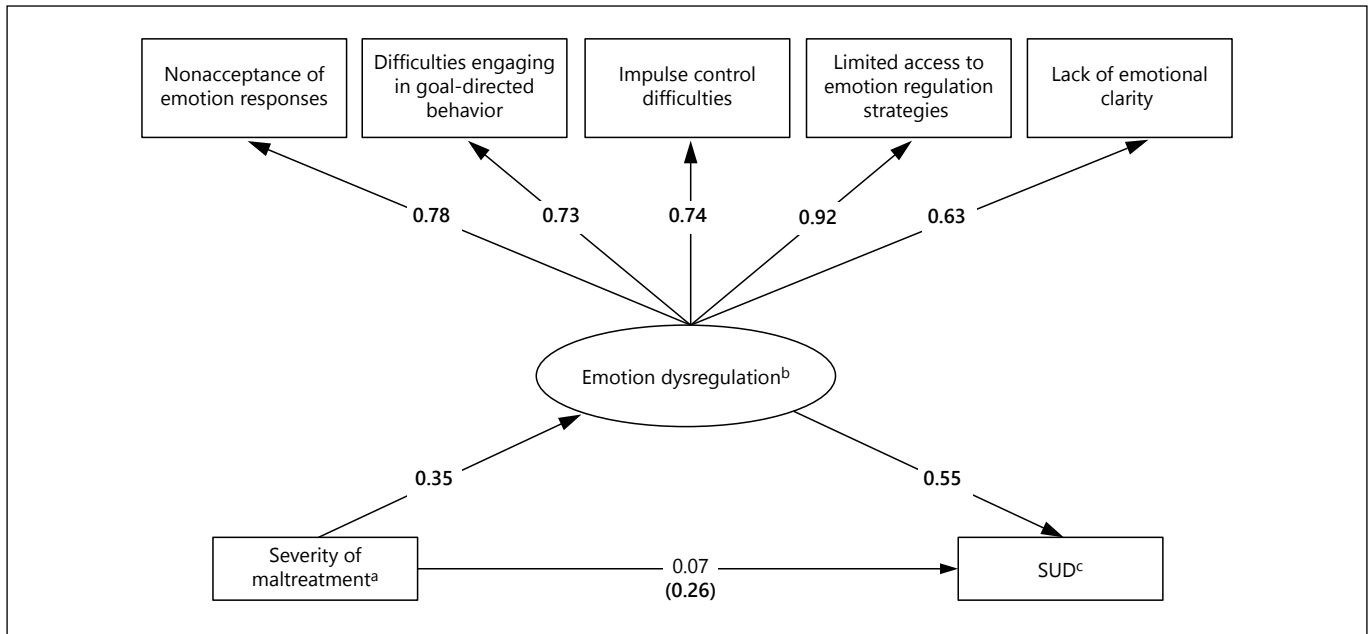


Fig. 2. Mediation model for the relationship between severity of maltreatment and presence of SUD. *n* = 146. Assessed with ^a CTQ, ^b DERS, ^c SCID-I. Numbers represent standardized path coefficients. Path coefficients presented in bold are significant (*p* < 0.01).

Path coefficient in brackets indicates unmediated association. Mediated model's fit indices: $\chi^2 = 26.23$, *d.f.* = 25, *p* = 0.396, CFI = 1.00, RMSEA = 0.018 (90% CI 0.000–0.069).

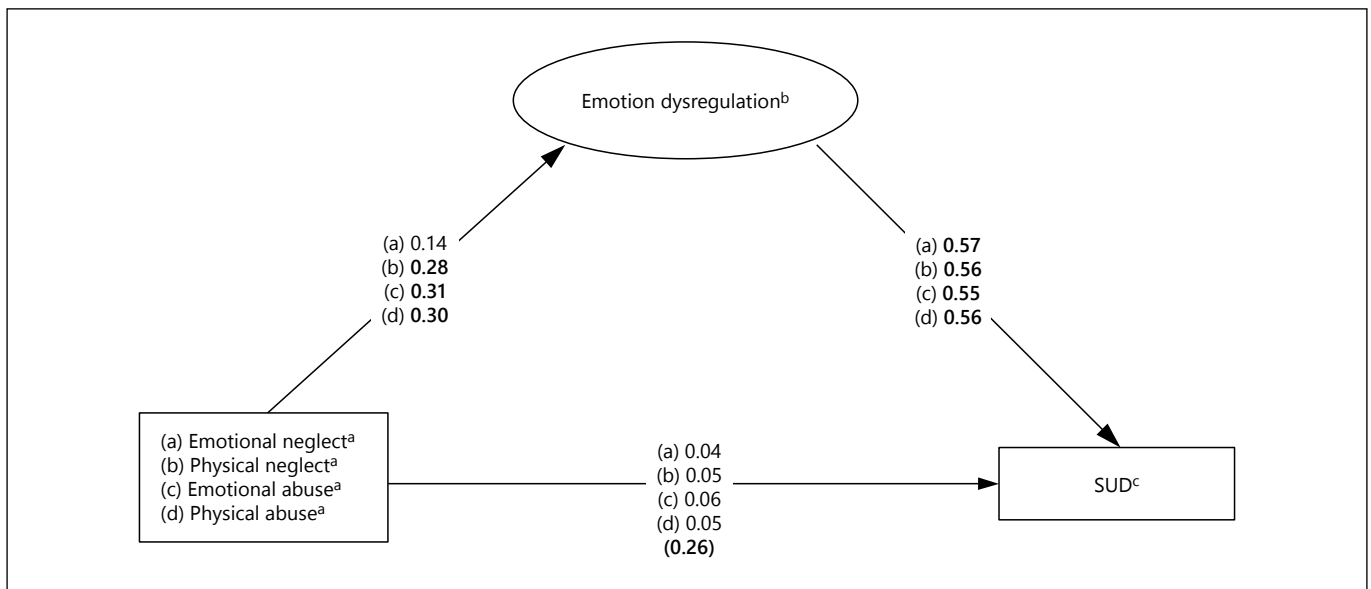


Fig. 3. Mediation model for the relationship between the severity of emotional and physical neglect and abuse and presence of SUD. *n* = 146. Assessed with ^a CTQ, ^b DERS, ^c SCID-I. Numbers represent standardized path coefficients. Path coefficients presented in bold are significant (*p* < 0.01). Path coefficient in brackets indicates unmediated association. Mediated model's fit indices: (a) $\chi^2 =$

27.27, *d.f.* = 25, *p* = 0.343, CFI = 1.00, RMSEA = 0.025 (90% CI 0.000–0.073). (b) $\chi^2 = 39.05$, *d.f.* = 25, *p* = 0.036, CFI = 0.97, RMSEA = 0.062 (90% CI 0.016–0.098). (c) $\chi^2 = 30.64$, *d.f.* = 25, *p* = 0.201, CFI = 0.99, RMSEA = 0.039 (90% CI 0.000–0.081). (d) $\chi^2 = 27.84$, *d.f.* = 25, *p* = 0.315, CFI = 0.99, RMSEA = 0.028 (90% CI 0.000–0.074).

eral types of maltreatment are related to more difficulties in emotion regulation [29, 42]. Emotional neglect was associated only with 2 subscales. This finding can be explained by the frequent co-occurrence of emotional neglect with other types of adverse childhood experiences [43]. In our sample, 78.8% of participants experienced emotional neglect, limiting the potential to detect potential relationships with emotion dysregulation. The lack of relationship between sexual abuse and emotion dysregulation is consistent with preceding findings [20, 21, 44]. This lack of relationship between sexual abuse and emotion dysregulation can be a consequence of the CTQ's difficulties to provide a dimensional representation of sexual abuse severity [44].

In general, emotion dysregulation is a unifying construct of diverse symptoms [14], which interact in a dynamic process. In light of emotion dysregulation's complexity, this construct facilitates an overview about different aspects on emotion regulation. However, conclusions about specific emotional processes in context of maltreatment and substance use cannot be drawn.

An aspect that needs further consideration relates to the understanding of the nature of the association between early maltreatment and emotion dysregulation. Difficulties in emotion regulation might be a direct consequence of maltreatment [21]. This association, however, might also be mediated through the elevated regulatory effort of intense negative emotions. Specifically, early maltreatment might lead to the experience of more frequent and more intense negative emotions that cannot be regulated with common emotion regulation strategies and thereby lead to emotion dysregulation. Previous studies provide partial support for this assumption by showing that the intensity of negative emotions increases after traumatic experiences [45] and that maltreatment in childhood and adolescence is associated with higher intensities of shame and sadness in adulthood [31].

Childhood abuse is also associated with a variety of other psychiatric disorders, like major depressive and anxiety disorders [46]. Furthermore, there is a high comorbidity between SUDs and mental disorders [47]. Deficits in emotion regulation are an integral part and consequence of several psychiatric disorders [7]. Accordingly, an influence of comorbid mental disorders in participants of the SUD group on group differences in emotion dysregulation and the relationship between early maltreatment and later SUDs cannot be ruled out.

Participants in the SUD group showed addictions to diverse groups of substances that differ in their effect on emotional state and regulation. Findings indicate that

these differences in drug use are also associated with differences in emotion regulation [48]. Hence, future studies should replicate the relationship between early maltreatment, emotional dysregulation and SUDs in the context of specific substance groups.

These study's results refer to the harmful influence of early maltreatment on children's and adolescents' ability to develop a functional way to regulate their emotions. Adolescents have a limited repertoire of emotion regulation strategies [49, 50]. In light of this, children and adolescents with a history of maltreatment can be seen as a vulnerable population with an increased risk to use substances as an emotion regulation strategy instead of more functional strategies. Our findings underline the importance of providing early therapeutic support to individuals with a history of childhood maltreatment to train adaptive cognitive and behavioural strategies for functional regulation of negative emotions [51].

Although the results of this study add valuable insight to the previous literature of the role of emotion dysregulation in the association between maltreatment and substance use, the following limitations must be taken into account. First, the cross-sectional study design limits the possibility to draw causal conclusions. Hence, it cannot be completely ruled out that in some cases, emotion dysregulation and the presence of an SUD influence each other reciprocally, and accordingly, that in some cases, emotion dysregulation might have evolved after manifestation of an SUD. We considered this possible reciprocal relationship by ensuring that in all cases, maltreatment preceded the first development of an SUD and investigating the association between the age of onset as well as duration of SUD and emotion dysregulation, which remained without significant outcome. Participants in both study groups experienced maltreatment, but we found relevant differences in the severity of different kinds of maltreatment. These differences in severity and occurrence of types of maltreatment might be one influential factor for the group differences we found regarding emotion dysregulation and SUDs [4]. Besides, comparison groups differ by gender, and therefore, all analyses were controlled for gender and the results remained the same. Further, sizes of the investigated samples differ, with more participants in the SUD group, than in the MH group. Lastly, even if our sample of severely maltreated participants is a major strength of this study, these results cannot be generalized to populations with other traumatic events, like single trauma events as accidents, and require replication in other trauma samples.

In this study, it was possible to provide evidence for the mediating role of emotion dysregulation between early emotional and physical maltreatment and later SUDs. This has implications for the understanding of the etiology of SUDs and for the development of appropriate treatment strategies, which should, in light of the present findings, become extended to improvement programs of emotion regulation strategies, even more than has hitherto been the case. From our findings, we also conclude the importance, for reasons of prevention, to treat maltreated populations before maladaptive compensatory regulation strategies, such as substance use, manifest as an integral part of the individuals' emotional regulation processes.

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Disclosure Statement

None.

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