

Emotion Dysregulation as a Mediator of the Relationship between Childhood Trauma and
Non-Suicidal Self-injury

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Abstract

The present study investigated whether emotion dysregulation links childhood abuse and non-suicidal self-injury (NSSI). Majority of literature suggests that childhood abuse subtypes and NSSI are associated. However, data regarding the influence of each subtype on NSSI have been contradictory, pointing towards a mediating mechanism. Maladaptive cognitive emotion regulation strategies constitute a strong candidate as a mediator, since a robust body of research linked childhood abuse and emotion dysregulation, and emotion dysregulation and NSSI. The current study fills the literature gap in a sense that it examined the three variables in the same model and compared different childhood abuse subtypes as well. Childhood emotional abuse was hypothesized to predict more frequent NSSI as it is the most pervasive childhood abuse subtype. A large mixed (non)clinical sample of 449 participants completed online questionnaires (~45 minutes) that assessed childhood trauma, cognitive emotion regulation and NSSI. Mediation analyses indicated that cognitive emotion dysregulation mediated the relation between childhood (emotional) abuse and NSSI. In addition, a stepwise regression analysis showed that childhood emotional abuse was the strongest predictor for more frequent NSSI when compared to other abuse subtypes. The present findings underline the central role of childhood emotional abuse and shed light on emotion dysregulation as an underlying mechanism between childhood abuse and NSSI. The mediating role of maladaptive cognitive emotion regulation indicates that it might be beneficial to pay attention to both Cognitive-Behavioral Therapy and emotion dysregulation to prevent and treat NSSI.

Keywords: childhood abuse, emotion dysregulation, cognitive emotion regulation, non-suicidal self-injury (NSSI)

1. Introduction

Non-suicidal self-injury (NSSI) is defined as intentional and self-initiated acts that harm bodily tissue without an immediate intention to commit suicide (Turner et al., 2015). The majority of NSSI research has shown that this behavior most commonly develops during adolescence with a lifetime prevalence rates of 13%-45% (Kaess et al., 2013). The frequency and methods of NSSI seem to differ among individuals: some engage in intermittent NSSI for a limited amount of time while others engage in repetitive NSSI through methods such as self-cutting, burning, scratching or hitting (Kaess et al., 2013). Previous research has demonstrated that NSSI may serve several functions including intrapersonal functions (i.e., affect regulation, automatic negative reinforcement, self-punishment and anti-dissociation) and social functions (i.e., interpersonal influence and peer bonding) (Kaess et al., 2013; Klonsky et al., 2015; Plener et al., 2016). These functions illustrate how individuals could potentially be motivated and reinforced to perform NSSI and how this behavior is developed and maintained. Although by its definition NSSI excludes any suicidal intent, the majority of literature has shown that NSSI constitutes a crucial risk factor for future suicide attempts. Klonsky et al. (2013) examined the association between NSSI, suicidal ideation, depression, anxiety, impulsivity, borderline personality disorder (BPD) and past suicide attempts. It was found that NSSI was the strongest risk factor after suicidal ideation. Thus, given the increasing prevalence rates of NSSI and heightened suicide risk associated with it, it is crucial to explore and understand underlying factors leading to this maladaptive behavior.

Previous literature has suggested numerous risk factors related to NSSI such as childhood trauma, invalidating and rejecting family environments, emotion dysregulation, dissociation, gender, age, sexual orientation, and socioeconomic status (Brown and Plener, 2017; Bureau et al., 2010; Lang and Sharma-Patel, 2011; Thomassin et al., 2016; Whitlock et al., 2006; Yates et al., 2008; Zetterqvist et al., 2013). Gender and age, as demographic variables, have been consistently shown to influence how frequently one performs NSSI. Research has suggested that earlier adolescence periods are riskier for NSSI engagement and that NSSI decreases in adulthood (Brown and Plener, 2017). For gender, on the other hand, previous findings are discrepant such that earlier research point towards younger females engaging in more NSSI, but other research show no such difference. Overall, among all the above-mentioned factors, the most investigated and prominent ones are childhood abuse and

emotion (dys)regulation (Brown and Plener, 2017; Lang and Sharma-Patel, 2011; Thomassin et al., 2016; Yates et al., 2008).

A substantial proportion of self-injurers also report a history of childhood abuse (Fleming and Aronson, 2016). In their review article, Fleming and Aronson (2016) explain the underlying mechanism between childhood abuse and NSSI, which is comprised of three interacting pathways: regulatory, representational and reactive pathways. Individuals who were maltreated as a child develop an irregular regulatory pathway (i.e., cognitive and affective processing and expression) which eventually leads these individuals to struggle with the irregular regulatory pathway and to self-injure to regulate emotions. An insecure child and caregiver attachment that impairs the representation of self and others may lead to maladaptive attempts to reduce emotional pain and to communicate their feelings through NSSI (i.e., representational pathway). An impaired reactive pathway refers to disturbances in neurobiological responses due to childhood abuse and leads to increased stress responses that might eventually facilitate NSSI as a coping strategy. The above-mentioned underlying mechanism between childhood abuse and NSSI points toward disturbances in emotion regulatory mechanisms. However, it does not examine the impact of each childhood abuse subtype, which has been shown to differ according to previous research.

In general, the Diagnostic and Statistical Manual of Mental Disorders (5th ed.; DSM-5; American Psychiatric Association, 2013) defines abuse as maltreatment by a family member (e.g., a caregiver, an adult partner) or by a nonrelative. *Child physical abuse* is defined as nonaccidental physical injury or harm to a child through using various physical methods that are inflicted by someone who has responsibility for the child (American Psychiatric Association, 2013). According to DSM-5, *child sexual abuse* includes sexual acts involving a child that are aimed to provide sexual gratification to an individual who has responsibility for the child (American Psychiatric Association, 2013). Furthermore, *child psychological or emotional abuse* encompasses nonaccidental or symbolic behaviors performed by a parent or a caregiver that has a potential to result in substantial psychological harm to the child (American Psychiatric Association, 2013).

Although childhood abuse has been linked to NSSI, it is still unclear whether a certain type of childhood abuse is specifically associated with NSSI. Most earlier research was conducted on childhood sexual abuse (Yates et al., 2008; Lang and Sharma-Patel, 2011).

Yates et al. (2008) and Lang and Sharma-Patel (2011) further explained that although less in number, some studies found childhood physical abuse to be a predictor of self-injury while evidence on the effect of childhood neglect and emotional abuse was mixed. An early systematic review by Briere and Gil (1998) showed that childhood sexual abuse was more strongly related to self-injury when compared to physical or emotional abuse. However, it was also indicated that the combination of sexual and non-sexual abuse demonstrated the strongest association with self-injury. In a more recent study, Gladstone et al. (2004) compared two samples of women with and without childhood sexual abuse, taking into account other variables such as physical abuse, depression, interpersonal violence, personality characteristics and comorbid disorders. They found that childhood sexual abuse showed the strongest relation to self-injury regardless of the influence of the other variables. Likewise, Yates et al. (2008) investigated the relation between childhood sexual abuse, physical abuse and NSSI in a community sample which had been followed since birth. The findings indicated that childhood sexual abuse led to more severe, recurrent (i.e., three or more events) NSSI whereas physical abuse led to intermittent (i.e., one to two events) injuring. The findings of Bruffaerts et al. (2010) further supported that childhood sexual and physical abuse were the strongest predictors for both the onset and persistence of suicidal self-injury in adolescents. However, one study (Swannell et al., 2012) found that childhood physical abuse increased the risk of NSSI while childhood sexual abuse did not. Regardless, the vast amount of early research showed that childhood sexual and physical abuse were two of the major subtypes of childhood trauma which were crucial risk factors for NSSI. Whether there is a direct relation between childhood trauma and NSSI, on the other hand, is controversial since there has been mixed data about potential mediators such as dissociation, alexithymia and self-criticism (Lang and Sharma-Patel, 2011; Swannell et al., 2012).

In summary, most earlier studies focused more on childhood sexual and physical abuse as risk factors for NSSI. More recent research has started to examine and demonstrate the role of childhood emotional abuse, neglect and dysfunctional family relationships, as it is difficult to separate sexual and physical abuse from an emotionally maltreating family environment (Bureau et al., 2010). Whitlock et al. (2006) found that both single and repeated self-injury were associated with childhood emotional abuse and only repeated self-injury had an association with childhood sexual abuse. Likewise, the findings of Klonsky and Moyer (2008) supported the idea that another form of childhood trauma rather than sexual abuse

only, may be related to self-injury as they found a relatively small relationship between childhood sexual abuse and self-injurious behavior. Bureau et al. (2010) expanded on the emotional aspect of childhood trauma by focusing on early family relationships and found that inadequate parenting or invalidating family environment could constitute a crucial risk factor for the onset and development of NSSI. They further speculated that parental criticism and perceived alienation might pave the way for the development of NSSI. Consequently, significant differences in fear and alienation were found in the sample of individuals who engaged in NSSI. In a similar vein, Kaess et al. (2013) examined the association between adverse childhood experiences (ACEs) and NSSI in a clinical population. They found that ACEs were strongly associated with NSSI, with the strongest associations belonging to maternal antipathy and neglect.

Interestingly, Thomassin et al. (2016), found that childhood emotional abuse was directly related to NSSI and rather than emotion coping, poor emotional expressivity (i.e., emotional awareness and expression) was a mediator between childhood emotional abuse and NSSI. In their review article, Brown and Plener (2017) emphasize the recent findings on childhood emotional abuse and its many facets (e.g., parental critique or apathy) and explain that some previous findings pointed towards a weaker association between childhood sexual abuse and NSSI. Furthermore, they state that NSSI is associated with multiple factors such as emotion dysregulation, unpleasant childhood experiences and interpersonal distress. They further explain that adolescents with repeated NSSI are highly at risk to continue maladaptive emotion regulation strategies even though NSSI tends to reduce later in life.

All in all, an increasing number of studies has started to emphasize the influence of emotional abuse, rather than sexual and physical abuse, on NSSI. Emotional abuse may show even stronger associations with NSSI than the latter two. Given the impact of early dysfunctional family relationships and trauma on psychopathology, it is plausible to assume that childhood emotional abuse has a potential to lead to maladaptive emotion regulation strategies and consequently to NSSI. However, history of emotion regulation research has differed in terms of its definition and what it pertains to. Therefore, a brief history of different emotion regulation definitions and models are presented below in order to demonstrate the development of the model that the present study was based on.

According to Gross (1998), emotion regulation had been a field of study in clinical psychology which had aimed to explore how individuals experience and express their emotions, and how they modulate the type of and the timing of these emotions. While early models of emotion regulation mainly investigated contextual stimuli, subsequent studies have focused more on cognitions' role in emotion regulation and have sought to integrate cognitive strategies with the early models. Gross' (1998) process model of emotion regulation proposed that emotion regulation process contained five points: selection of the situation, modification of the situation, deployment of attention, change of cognitions and modulation of responses. Gratz and Roemer (2004) extended this model by stating that emotion regulation should also include conscious experience and awareness of emotions. Similarly, current models have added to Gratz and Roemer's (2004) model by proposing cognitive emotion regulation as a cognitive coping mechanism which handles emotionally arousing information (Garnefski and Kraaij, 2006; Thompson, 1991). More specifically, Garnefski and Kraaij (2006) explained that cognitive emotion regulation is an essential part of human life which helps regulate emotions through cognitions and assists individuals to cope with emotions after a stressful life event. It was further shown that individuals differ in nine cognitive emotion regulation strategies they apply: Self-blame, Other-blame, Rumination, Catastrophizing, Putting into Perspective, Positive Refocusing, Positive Reappraisal, Acceptance and Planning (Garnefski et al., 2001). Moreover, studies found that the use of some of these strategies (e.g., Rumination, Catastrophizing, Self-blame and Other-blame) was maladaptive in a sense that they render individuals more vulnerable for developing emotional problems and psychopathology (Garnefski et al., 2006; Aldao and Nolen-Hoeksema, 2010).

Even though models or criteria for emotion dysregulation have varied across studies, the majority has focused on trait-level emotion dysregulation, as measured with the DERS subscale "limited access to emotion regulation strategies" (i.e., a self-report measure of emotion regulation), in both clinical and non-clinical samples of individuals who engage in NSSI (Andover and Morris, 2014). Gratz and Tull (2010) found elevated scores on the DERS subscales "limited access to effective emotion regulation strategies", "difficulties engaging in goal-directed behaviors when distressed", and "emotional nonacceptance" among NSSI participants with substance use disorder (SUD). Subsequently, they concluded that there was a particular association between NSSI and emotion dysregulation. Furthermore, Gratz and Roemer (2008) found emotion dysregulation to be more significantly associated with frequent

NSSI compared to emotion in-expressivity, affect intensity/reactivity and maltreatment. Likewise, Klonsky et al. (2003) stated that peer reports of self-harmers revealed odd and intense emotional reactions especially to interpersonal rejection. Lastly, Garnefski and Kraaij (2006) found that while maladaptive cognitive emotion regulation strategies (i.e., rumination and catastrophizing) showed a significant positive correlation with depressive symptoms, adaptive strategies (i.e., positive reappraisal) resulted in a significant negative correlation.

The discoveries of cognitions' influence on emotions and behavior suggest that human behavior tendencies cannot be separated from cognitions, and emotions, cognitions and environmental stimuli go hand in hand in producing behavior. Given the fact that individuals differ in how they think, and that this has a potential to influence how they manage their emotions, it is more practical and plausible to assume that maladaptive cognitive strategies lead to ineffective emotion regulation attempts and finally to NSSI. Hence, the present study focused primarily on the abovementioned nine cognitive emotion regulation strategies as a measure of emotion (dys)regulation.

To summarize, the literature on NSSI has shown that childhood abuse and its subtypes (i.e., physical, sexual and emotional abuse and neglect) play a pivotal role in the development of NSSI. Although early studies suggested that childhood sexual and physical abuse were directly related to NSSI and that the evidence on childhood emotional abuse was mixed (Yates et al., 2008; Lang and Sharma-Patel, 2011), some recent studies have shown otherwise (Brown and Plener, 2017; Kaess et al., 2013; Klonsky and Moyer, 2008). The fact that studies on childhood abuse have shown inconsistencies suggests that there might be other factors related to childhood abuse such that they influence the relationship between childhood abuse and NSSI. A substantial amount of literature has suggested that emotion regulation may underlie the link between childhood abuse and NSSI, since it shows strong associations not only with NSSI, but also with childhood abuse. Bradley et al. (2011), for instance, stated that emotion dysregulation stemmed from the interaction of temperament and early adverse circumstances. Consequently, children with elevated levels of emotional reactivity developed emotion dysregulation when they experienced adverse environmental circumstances and maltreatment. Similarly, in their review article, Dvir et al. (2014) explained that childhood maltreatment, especially if it is repeated, impedes the appropriate development of emotion regulation and interpersonal skills. Thus, emotion regulation has shown to be one of the strongest factors that could mediate the relationship between childhood abuse and NSSI.

NSSI poses a widespread concern not only in clinical, but also in non-clinical samples of individuals. The increasing prevalence rates (Whitlock et al., 2006; Kaess et al., 2013) makes it essential to investigate risk factors and mediators in order to develop efficient prevention and intervention programs. Since the previous literature has suggested that earlier periods of life are more critical in terms of the initiation and continued application of NSSI, investigating the nature of NSSI and its underlying mechanisms in younger mixed clinical and non-clinical populations should be a focus in order to promote mental health while differentiating NSSI from suicide attempts.

In the light of the previous research, this study aimed to investigate whether emotion dysregulation links childhood trauma/abuse and self-injurious behaviors in a mixed clinical and non-clinical sample. Based on the literature, it is likely that there is a link between childhood trauma/abuse, emotion dysregulation and NSSI. Whether this relation is mediated by maladaptive cognitive emotion regulation strategies, on the other hand, was not thoroughly investigated since there are very few studies including all three variables especially in mixed clinical and non-clinical samples.

In accordance with the previous findings, it was hypothesized that childhood trauma/abuse predicts poor cognitive emotion regulation skills and thereby self-injurious behavior. As a result, emotion dysregulation was the proposed mediator between childhood trauma/abuse and NSSI. More specifically, it was further hypothesized that childhood trauma/abuse would predict the use of maladaptive cognitive emotion regulation strategies (i.e., Rumination, Catastrophizing, Self-blame, and Other-blame) in participants engaging in NSSI, with childhood emotional abuse predicting more frequent NSSI. The present study first aimed to test for an overall effect of childhood abuse on NSSI and then test for the effects of the specific subtypes (i.e., physical, sexual and emotional abuse and neglect). Childhood emotional abuse was hypothesized to predict more frequent NSSI as it is the most pervasive form of childhood abuse which usually co-occurs with childhood sexual and physical abuse.

2. Methods

2.1. Participants

Participants were recruited through SONA (i.e., research participation website system of Leiden University) (18.5%), social media platforms such as Facebook, and other online platforms for individuals who suffer from Borderline Personality Disorder and who have experienced domestic violence, childhood maltreatment and self-harm behavior. To acquire a preferably large heterogeneous sample, a mixed clinical (22.6%) and non-clinical (77.4%) community sample with both male ($N=155$; 25%) and female adults ($N=418$; 68%) was included in the study. Participants had diverse ethnicity consisting of Western Europe ($N=173$), Asia ($N=57$), Middle East ($N=19$), Eastern Europe ($N=5$) and North American ($N=2$). The participants were mostly undergraduate ($N=199$) and secondary school graduates ($N=115$) with a smaller proportion of graduate students ($N=71$), postgraduate students ($N=19$) and primary school graduates ($N=5$). One hundred and thirty-three participants were employed, fifty-nine were unemployed and one hundred and forty-four were student. Furthermore, approximately 63% ($N=286$) of the participants were not in a relationship while 36% ($N=164$) of the participants were in a relationship. Inclusion criteria were an ability to understand and provide informed consent, age above 18, and sufficient English proficiency¹. A total of 611 participants started the survey, while some of the respondents ($N=162$) did not complete all questionnaires of interest, resulting in a final sample size of 449 participants. Only full responses were used in the analyses. The participants aged between 18 and 75 years ($M=28.83$, $SD=13.19$).

2.2. Procedure

The current study was approved by the Ethics committee of Leiden University. Data was collected between March 2016 and July 2017 through an online survey using the software Qualtrics (© 2015, Qualtrics, Provo, UT). At the beginning of the survey, participants were informed about the nature of the questionnaires and were asked to accept an informed consent item. All participants were provided with information about the aim and background of the study, potential risks, the right to cease the survey at any time without consequences and

¹ Sufficient English proficiency was defined as ability to understand the main points of clear standard input on familiar matters regularly encountered in work, school, and leisure, as checked before and after the survey. A negative response to the item "Do you rate your English proficient enough to understand basic terminology regarding personal and family matters?" led to termination of the survey.

reimbursement for study participation. After agreeing on the informed consent and indicating sufficient English proficiency, the questionnaires could be accessed. Several questions about basic demographics (i.e., age, biological sex, nationality, education) and relationship status were asked. Then, participants filled in three standardized questionnaires that assessed childhood abuse, emotion regulation strategies and self-harm behaviors through Qualtrics. The Childhood Trauma Questionnaire (CTQ; Bernstein et al., 2003), Cognitive Emotion Regulation Strategies Inventory (CERQ; Garnefski, Kraaij & Spinhoven, 2001) and Self-Harm Inventory (SHI; Sansone, Wiederman & Sansone, 1988) were presented in a randomized order across respondents and the whole survey took approximately 35-45 minutes. Following the completion of the questionnaires, participants provided information about previous and current psychopharmacological and psychotherapeutic treatment, and about psychiatric diagnoses. At the end, participants were asked if they were “[...] unable to answer one or more questions due to a lack of English proficiency” (a YES response resulted in post-hoc exclusion from the analysis). Participants were given the contact information of the principal investigator of the research (Annegret Krause-Utz), a trained clinical psychologist, whom they could contact in case of any discomfort experienced due to the sensitive nature of questions. Lastly, participants were provided with an opportunity to participate in a lottery (a chance of winning one of eleven 25€ Amazon© vouchers). Psychology students could alternatively obtain study credits for their participation through SONA. There were no deceptions and unobtrusive methods; participants were fully debriefed and were asked to indicate whether they would like to receive the results of the research. Data was not collected anonymously but was saved in a coded way.

2.3. Measuring Instruments

The *Childhood Trauma Questionnaire (CTQ)*, which consisted of 28 items, was applied to measure experiences of childhood abuse severity. The CTQ is a retrospective self-report scale that assesses emotional, physical and sexual abuse, emotional and physical neglect and minimization/denial (Bernstein et al., 2003). Items were measured on a five-point, Likert-type scale ranging from never true (= 0) to very often true (= 5) and the maximum score was 25. The CTQ showed overall excellent psychometric properties, test-retest reliability ranging from 0.79 to 0.84, internal consistency coefficients between $\alpha = 0.66$ and $\alpha = 0.92$, and good convergent validity according to therapist ratings (Bernstein & Fink, 1998).

Emotion regulation was measured by using the 18-item short version of the *Cognitive Emotion Regulation Strategies Inventory (CERQ)* (Garnefski, Kraaij & Spinhoven, 2001) which is a multidimensional measure of nine cognitive emotion regulation strategies after having experienced a threatening or stressful life event (between “1= almost never” to “5= almost always”). Each item is a statement such as “*I often think about how I feel about what I have experienced*” and higher scores on a specific coping strategy mean a more frequent use of that strategy. CERQ consists of 36 items and measures four maladaptive and five adaptive coping strategies (four items per subscale). Higher scores on the subscales “Rumination” (i.e., repetitive thinking about aspects and feelings related to an event), “Catastrophizing” (i.e., emphasizing the terror of an experience), “Self-blame” and “Other-blame” have been associated with more mental health problems, therefore representing “maladaptive” strategies (Garnefski, Kraaij, & Spinhoven, 2001). More use of “Positive reappraisal” (i.e., attaching a positive meaning to an event: e.g., personal growth), “Positive refocusing”, “Putting into perspective”, “Planning”, and “Acceptance” have been related to lower levels of stress, depression, and anxiety (Lazarus & Folkman, 1984; Martin & Dahlen, 2005), therefore representing “symptom protective” or “adaptive” strategies (Garnefski, Kraaij, & Spinhoven, 2001). As emotion dysregulation was the variable of interest, only the four scales of “maladaptive” strategies were used. CERQ is suitable for both clinical and community populations aged 12 and older and it showed an acceptable construct validity with Cronbach’s alpha ranging from 0.64 to 0.82. (Garnefski, Kraaij & Spinhoven, 2001). All subscales showed good internal consistencies and reliability (Garnefski & Kraaij, 2006; Garnefski, Kraaij, & Spinhoven, 2001).

The *Self-Harm Inventory (SHI)* is a 22-item, yes/no, short self-report questionnaire. It measures types and frequency of NSSI, suicidal behavior (e.g. overdosing on purpose, attempting suicide), and other deliberately self-damaging behaviors (e.g., disordered eating, intentionally exercising an injury, starving oneself to hurt oneself, abusing laxatives to hurt oneself, engagement in emotionally and/or sexually abusive relationships, risky promiscuity, losing a job on purpose). NSSI was assessed by multiple forms of deliberate self-harm behaviors (e.g., cutting oneself, burning oneself, punching oneself, scratching oneself, preventing wounds from healing, making medical situations worse, and other forms of tissue damage) through using SHI. Participants were instructed to indicate if they ever intentionally, on purpose, or to hurt themselves, engaged in any such self-harm behaviors. For most items,

the questionnaire asks for the frequency of the target behavior that the respondent had engaged in. After the participants completed the SHI, the total score was the sum of all “yes” responses. The maximum score was 22 with higher scores indicating more severe self-harm behaviors. The SHI showed good validity and reliability and is suitable for both psychiatric, primary care settings and the general population (Sansone & Sansone, 2010).

2.4. Statistical Analyses

IBM SPSS Statistics (IBM Corp. Released 2017. IBM SPSS Statistics for Windows, Version 25.0. Armonk, NY: IBM Corp.) was used for all data analyses. Mediation analyses were conducted to investigate the relationship between childhood (emotional) abuse, emotion dysregulation and NSSI, via using the Model 4 of the PROCESS macro in SPSS (Hayes, A. F., 2013). In the first mediation analysis, the variables childhood abuse (i.e., the predictor variable; the sum score of all CTQ subscales), emotion dysregulation (i.e., the mediator; the sum score of the four “maladaptive” subscales of CERQ) and NSSI (i.e., the outcome variable; the sum score of the items that measure self-injury in SHI) were examined. In the second mediation analysis, the variables childhood emotional abuse (i.e., the predictor variable; the sum score of the CTQ subscale “childhood emotional abuse”), emotion dysregulation (i.e., the mediator; the sum score of the four “maladaptive” subscales of CERQ) and NSSI (i.e., the outcome variable; the sum score of the items that measure self-injury in SHI) were examined. To compare the impact of childhood abuse subtypes on NSSI, a stepwise multiple regression analysis was conducted by separately entering the sum scores of each CTQ subscale as the predictors and the sum score of the items measuring self-injury in SHI as the dependent variable. Additional tests to check for multicollinearity indicated very low levels of multicollinearity between emotional abuse and physical abuse ($VIF = 1.88$), sexual abuse ($VIF = 1.70$) and physical neglect ($VIF = 1.37$). Multicollinearity was slightly higher between emotional abuse and emotional neglect ($VIF = 3.21$) and minimization/denial ($VIF = 2.55$).

Independent samples t-tests were applied to see any possible gender differences in other demographic variables. Exploratory correlational analyses between CTQ subscales and self-injury items in SHI were applied to investigate further the link between childhood abuse subtypes and NSSI frequency.

3. Results

3.1. Distributions and Demographics

An independent samples t-test revealed that male ($N = 123$, $M = 32.78 \pm SD = 16.51$) and female ($N = 319$, $M = 27.43 \pm SD = 11.43$) participants significantly differed in terms of their age ($t_{(440)} = 3.86$, $p < .001$, $d = .377$). There were no significant differences in education level between males and females ($\chi^2 = 3.01$, $p = 0.81$). Similarly, male and female participants did not significantly differ in their relationship status ($\chi^2 = .48$, $p = .49$) or in their nationality ($\chi^2 = 4.39$, $p = .49$). Table 1 shows distribution of scores for childhood trauma, emotion dysregulation and NSSI and age.

Table 1. Distribution of scores for Childhood Trauma, Emotion Dysregulation and NSSI and Age

Variable	N	<i>M</i> ± <i>SD</i>
CTQ sum (childhood trauma severity)	449	45.66 ± 22.21
Emotional Abuse	478	10.46 ± 5.87
Sexual Abuse	478	8.01 ± 6.08
Physical Abuse	481	7.30 ± 4.44
Emotional Neglect	478	17.94 ± 6.01
Physical Neglect	478	12.29 ± 2.16
Minimization/Denial	478	9.14 ± 3.75
Emotion Dysregulation (CERQ sum)	450	2.65 ± 0.63
Self-blame	473	2.85 ± 1.02
Rumination	475	3.23 ± 0.95
Catastrophizing	473	2.40 ± 1.08
Other-blame	473	2.1 ± 0.85
NSSI sum	450	1.06 ± 1.46
Age	447	28.83 ± 13.19

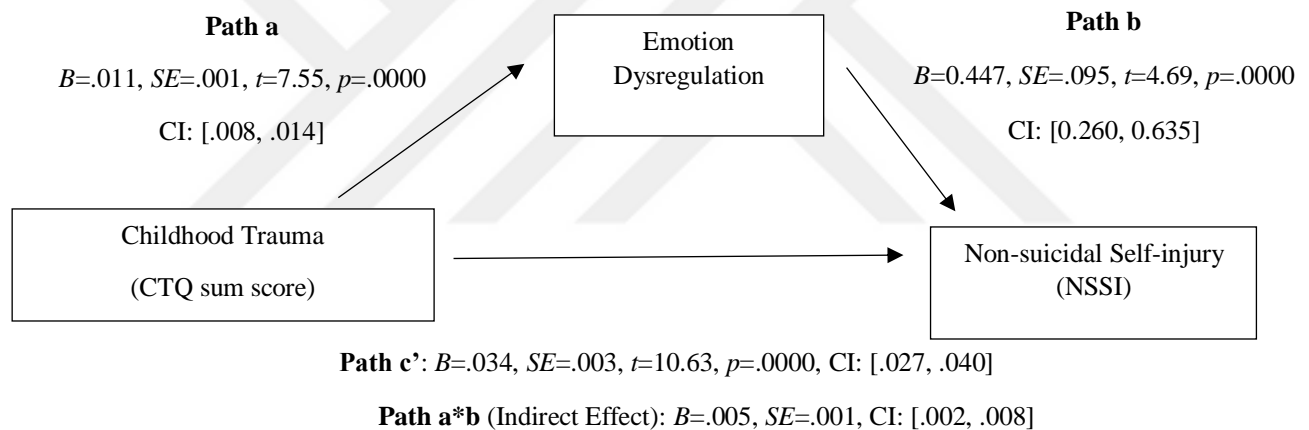
Note: Table shows means (*M*) ± standard deviations (*SD*) of scores. CTQ=Childhood Trauma Questionnaire, NSSI=Non-suicidal Self-injury.

3.2. Main Analyses

A mediation analysis (Process model 4) was conducted to test whether emotion dysregulation mediated the relationship between childhood abuse and NSSI, controlling for age and gender. The overall model was significant ($F_{(4,436)} = 53.35$, $p < .001$, $R^2 = 0.33$, CI: [-2.291, -0.906]), showing that approximately 33% of the variance in NSSI was explained by all predictors in the model. As covariates, age ($B = -.017$, $SE = .005$, $t = -3.39$, $p < .001$, CI: [.028, -.007]) was statistically significant while gender ($B = 0.239$, $SE = 0.129$, $t = 1.85$, $p > .05$, CI: [-.015, 0.492]) was not.

As shown in Figure 1, childhood abuse significantly positively predicted emotion dysregulation (*path a*: $B = .011$, $SE = .001$, $t = 7.55$, $p < .001$, CI: [.008, .014]) and emotion dysregulation significantly positively predicted NSSI (*path b*: $B = 0.447$, $SE = .095$, $t = 4.69$, $p < .001$, CI: [0.260, 0.635]). Furthermore, there was a significant indirect effect of childhood abuse through emotion dysregulation on NSSI (*path a*b*: $B = .005$, $SE = .001$, CI: [.002, .008]). These results confirm the hypothesis that emotion dysregulation has a mediating effect, while the direct effect of childhood trauma when considering emotion dysregulation was still significant (*path c'*: $B = .034$, $SE = .003$, $t = 10.63$, $p < .001$, CI: [.027, .040]). Thus, emotion dysregulation explained a substantial, but not all part of childhood abuse's effect on NSSI. The effect of childhood abuse decreased when emotion dysregulation was taken into account.

Figure 1. Results for the analysis with childhood trauma as a predictor of non-suicidal self-injury, mediated by emotion dysregulation.



3.2.1. 6-Step Multiple Regression Analysis

A 6-step multiple regression analysis was conducted to test which type of childhood abuse was the strongest predictor of NSSI. As shown in Table 2, emotional abuse was the strongest predictor ($B = .058$, $SE = .021$, $b = 0.235$, $t = 2.71$, $p < .01$) compared to sexual abuse ($B = .042$, $SE = .013$, $b = 0.174$, $t = 3.26$, $p < .01$), physical abuse ($B = -.020$, $SE = .021$, $b = -.060$, $t = -0.915$, $p > .05$), emotional neglect ($B = -.060$, $SE = .018$, $b = -0.246$, $t = -3.74$, $p < .01$), and physical neglect ($B = .060$, $SE = .033$, $b = .088$, $t = 1.85$, $p > .05$). The effect of minimization/denial was not significant ($B = -.004$, $SE = .028$, $b = -.009$, $t = -0.132$, $p > .05$). The overall regression model resulted in a $F_{(6,442)}$ value of 27.486 with $p < .001$, $R^2 = 0.272$ and $R^2_{(adj)} = 0.262$. Therefore, the second hypothesis that childhood emotional abuse is the

strongest predictor in the relationship between childhood trauma, emotion dysregulation and NSSI was confirmed as well.

Table 2. Results of the 6-step multiple regression analysis with abuse subtypes

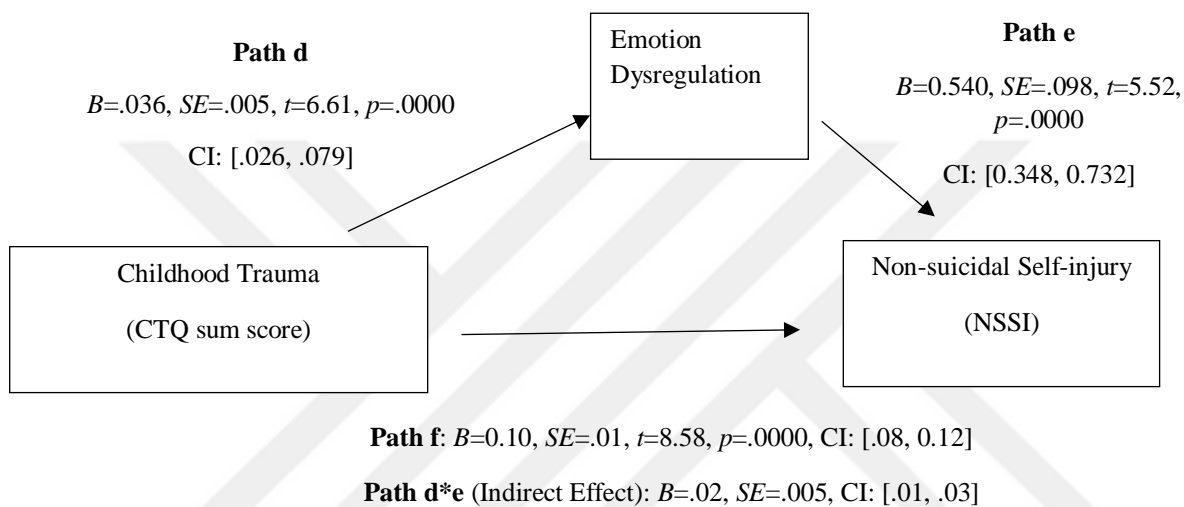
Variable	B	Std. Error	Beta	t	R	R ²	ΔR ²
Step 1					0.475	0.225	0.224
Emotional Abuse	0.118	.010	0.475	11.40***			
Step 2					0.498	0.248	0.245
Emotional Abuse	.088	.013	0.357	6.89***			
Sexual Abuse	.046	.012	0.192	3.71***			
Step 3					0.500	0.250	0.245
Emotional Abuse	.098	.017	0.394	5.84***			
Sexual Abuse	.048	.013	0.203	3.81***			
Physical Abuse	-.018	.022	-.056	-0.849			
Step 4					0.515	0.266	0.259
Emotional Abuse	.065	.020	0.263	3.34**			
Sexual Abuse	.044	.013	0.185	3.49**			
Physical Abuse	-.017	.021	-.051	-0.788			
Emotional Neglect	-.046	.015	-0.187	-3.10**			
Step 5					0.521	0.272	0.263
Emotional Abuse	.059	.020	0.239	3.00**			
Sexual Abuse	.042	.013	0.175	3.29**			
Physical Abuse	-.020	.021	-.061	-0.940			
Emotional Neglect	-.061	.017	-0.250	-3.65***			
Physical Neglect	.061	.032	.089	1.92			
Step 6					0.521	0.272	0.262
Emotional Abuse	.058	.021	0.235	2.71**			
Sexual Abuse	.042	.013	0.174	3.26**			
Physical Abuse	-.020	.021	-.060	-0.915			
Emotional Neglect	-.060	.018	-0.246	-3.24**			
Physical Neglect	.060	.033	.088	1.85			
Minimization/Denial	-.004	.028	-.009	-1.32			

Note. * $p < .05$, ** $p < .01$, *** $p < .001$

An additional mediation analysis was conducted, with childhood emotional abuse as the predictor, to test whether there was a significant mediating effect of emotion dysregulation for this specific subtype of childhood trauma. The overall model was significant ($F_{(4,436)} = 41.71, p < .001, R^2 = 0.28, CI: [-2.32, -0.88]$), showing that approximately 28% of the variance in NSSI was explained by the predictors. As shown in Figure 2, the results were similar to the previous mediation analysis: childhood emotional abuse significantly positively predicted emotion dysregulation (*path d*: $B = .036, SE = .005, t = 6.61, p < .001, CI: [.026, .047]$) and emotion dysregulation significantly positively predicted NSSI (*path e*: $B = 0.540, SE = .098, t = 5.52, p < .001, CI: [0.348, 0.732]$). There was a significant indirect effect of childhood emotional abuse through emotion dysregulation on NSSI (*path d*e*: $B = .02, SE =$

.005, CI: [.01, .03]). Similarly, there was no full mediation because even when emotion dysregulation was considered, childhood emotional abuse significantly predicted NSSI (*path f*: $B = 0.10$, $SE = .01$, $t = 8.58$, $p < .001$, CI: [.08, 0.12]). All in all, emotion dysregulation explained a substantial part, but not all of the effect of childhood emotional abuse on NSSI. As covariates, age ($B = -.008$, $SE = .005$, $t = -1.57$, $p > .05$, CI: [-.02, .002]) and gender ($B = 0.22$, $SE = 0.13$, $t = 1.66$, $p > .05$, CI: [-.04, 0.49]) was not statistically significant.

Figure 2. Results for the analysis with childhood emotional abuse as a predictor of non-suicidal self-injury, mediated by emotion dysregulation.



3.3. Correlational Analyses

Additional exploratory correlational analyses between CTQ subscales and NSSI were administered in order to examine associations between childhood abuse subtypes and NSSI frequency. Table 3 shows the Pearson correlation coefficients and the p-values of abuse subtypes and NSSI frequency. A moderate positive correlation between NSSI and emotional abuse ($r = 0.475$, $p < .01$), as well as sexual abuse ($r = 0.410$, $p < .01$) and physical abuse ($r = 0.365$, $p < .01$) was found. The analyses with emotional neglect, physical neglect and minimization/denial revealed mild to moderate negative correlations with NSSI (emotional neglect: $r = -0.445$, $p < .01$, physical neglect: $r = -.027$, $p > .01$, minimization/denial: $r = -0.420$, $p < .01$).

Table 3. Results for the correlation analysis with abuse subtypes

Dependent Variable	Emotional Abuse	Sexual Abuse	Physical Abuse	Emotional Neglect	Physical Neglect	Minimization/Denial
NSSI	0.475**	0.410**	0.365**	-0.445**	-.027	-0.420**

Note. ** $p < .01$. One participant who completed NSSI measure only was excluded from the analysis ($N=449$).

4. Discussion

The aim of the current study was to investigate the association between childhood abuse and non-suicidal self-injury (NSSI) with an emphasis on cognitive emotion dysregulation as the potential mediator. Building on the previous literature, emotion dysregulation was proposed to be the mediator as it has been shown that a history of childhood abuse reinforces maladaptive cognitive emotion regulation strategies that eventually pave the way for NSSI as a coping strategy (Thomassin et al., 2016). More specifically, childhood emotional abuse was hypothesized to be the strongest predictor for more frequent NSSI due to an increasing number of recent studies showing the central role of this abuse subtype in NSSI (Bureau et al., 2010).

The mediation analyses showed that emotion dysregulation mediated the relation between childhood abuse and NSSI, and more specifically, between childhood emotional abuse and NSSI. When emotion dysregulation was included in the model(s), the link between childhood (emotional) abuse and NSSI was still significant, but it was weaker. In other words, emotion dysregulation explained a substantial, but not all, part of the link between childhood abuse and NSSI. This finding is in line with previous literature which reported significant relations between childhood abuse and NSSI (Briere and Gil, 1998; Gladstone et al., 2004; Whitlock et al., 2006; Klonsky and Moyer, 2008; Yates et al., 2008; Bureau et al., 2010; Bruffaerts et al., 2010; Lang and Sharma-Patel, 2011; Swannell et al., 2012; Kaess et al., 2013; Thomassin et al., 2016; Brown and Plener, 2017).

The finding that both childhood abuse and the subtype emotional abuse were related to emotion dysregulation and NSSI support that not only the overall childhood maltreatment severity, but also emotional abuse, in specific, substantially predicts NSSI. In a similar vein, the stepwise multiple regression analysis further showed that childhood emotional abuse was the strongest predictor for more frequent NSSI when compared to other subtypes of childhood abuse. Therefore, the current findings support recent studies that compared different subtypes of childhood abuse and found stronger relations between the subtype childhood emotional abuse and NSSI (Bureau et al., 2010; Kaess et al., 2013; Thomassin et al., 2016; Brown and Plener, 2017). The findings that childhood sexual abuse was the second strongest predictor and that its effect did not significantly differ from that of childhood emotional abuse are also in line with the earlier research indicating that childhood sexual abuse is strongly related to

NSSI (Briere and Gil, 1998; Gladstone et al., 2004; Yates et al., 2008; Bruffaerts et al., 2010; Lang and Sharma-Patel, 2011). In contrast to the previous research, however, childhood physical abuse and emotional neglect were negatively associated to NSSI. It is not clear why these negative associations were found considering the literature demonstrating childhood physical abuse and emotional neglect as predictors for NSSI (Yates et al., 2008; Bureau et al., 2010; Bruffaerts et al., 2010; Swannell et al., 2012; Kaess et al., 2013). The discrepant results might be due to factors such as different sample characteristics (i.e., sample size, (non)clinical sampling, demographics, and ethnic diversity) and methods (i.e., some of these studies were prospective and some applied face-to-face interviews). Overall, in conjunction with the previous literature, the current findings support that childhood abuse and especially emotional abuse, leads to NSSI through an emotionally invalidating childhood environment that impairs the development of adaptive cognitive emotion regulation skills.

In the first mediation analysis with childhood abuse as predictor, age (as a covariate) had a significant effect on NSSI as well: it was found that younger participants were more likely to engage in NSSI than older participants were. This is consistent with the previous literature showing that adolescents are highly at risk for NSSI and that NSSI usually reduces later in life (e.g., Brown and Plener, 2017). However, the fact that the current sample aged between 18-75 makes it difficult to make any assumptions about an earlier adolescence period. Regardless, the finding confirms that NSSI is more prevalent in especially earlier periods of life. The second mediation analysis with childhood emotional abuse, however, revealed no such effect of age. It might be the case that childhood emotional abuse shows its influence in a more pervasive way, such that the emotionally damaging aspect of abuse impairs adaptive emotion regulation skills more severely, leading to a long-lasting psychopathology and NSSI.

Gender, as a covariate, did not have any significant influence on the relationship between childhood (emotional) abuse, emotion dysregulation and NSSI. The data regarding gender differences has been controversial. While some research has shown significant gender differences in NSSI frequency (Whitlock et al., 2006; Sim et al., 2009; Zetterqvist et al., 2013; Brown and Plener, 2017), others have shown no such differences (Yates et al., 2008; Bureau et al., 2010; Thomassin et al., 2016). According to Brown and Plener (2017) and Lang and Sharma-Patel (2011), early studies showed a large gender difference pointing towards younger females engaging in more NSSI. However, these studies included clinical

populations in which females were overrepresented, and general populations showed less consistent gender differences (Lang and Sharma-Patel, 2011). The contradictory findings about gender differences might have stemmed from different sample characteristics. Therefore, the mixed clinical and nonclinical sample in the current study might explain why there were no such gender differences.

NSSI has been a prevalent risk factor, especially among clinical and non-clinical samples of youth, that could lead to suicide attempts. Although research has shown that NSSI usually reduces in adulthood, the associated suicide risk makes it crucial to investigate underlying factors related to NSSI to develop more efficient intervention attempts. A history of childhood abuse and emotion dysregulation have been indicated to be such factors that could strongly contribute to NSSI (e.g., Yates et al., 2008; Bureau et al., 2010; Lang and Sharma-Patel, 2011). Previous studies on childhood abuse showed inconsistencies about the influence of its subtypes on NSSI, pointing towards a potential mediating mechanism that could link childhood abuse and NSSI. Alongside of previous research, present findings suggest that emotion dysregulation constitutes a strong candidate as this potential mediating mechanism, since childhood abuse and emotion dysregulation were shown to be associated with each other as well (e.g., Bradley et al., 2011; Dvir et al., 2014).

Most often, studies, which merely had clinical samples, investigated childhood abuse and emotion dysregulation separately from each other. Only one study (Thomassin et al., 2016) with psychiatric inpatients tested childhood abuse and emotion-related skills simultaneously in the same model. However, this study assessed only two specific emotion-related skills (i.e., emotion expressivity and emotion coping) as mediators. The current study, on the other hand, focused more on the cognitive aspect of emotion dysregulation and assessed nine (mal)adaptive cognitive emotion regulation strategies in a more comprehensive manner. Hence, the current study fills the abovementioned literature gaps in a sense that it showed the mediating role of cognitive emotion dysregulation in the relationship between self-reported childhood abuse and NSSI. The sample consisted of a large number of ethnically diverse, mixed clinical and non-clinical individuals, which enhanced generalizability of the results. The findings support more recent research showing that childhood emotional abuse constitutes a pervasive aspect of childhood abuse which in turn, predicts NSSI more strongly.

The current study has several methodological limitations concerning the design of the study. Firstly, it was a cross-sectional design, which makes it impossible to make any causal and temporal interpretations. Even though a retrospective assessment of childhood abuse helps make a temporal inference, one cannot make any certain causal claims. Future studies which embody a prospective design will help provide such interpretations regarding the influence of childhood abuse on emotion dysregulation and NSSI. Studies using an assessment of previously documented childhood abuse, for instance, will be able to make stronger temporal interpretations. Alternatively, a longitudinal design assessing abuse in early childhood and following the participants during adolescence and adulthood will be able to provide causal interpretations. However, such a study could be impractical and difficult to apply in a way that it might raise ethical concerns. Secondly, the current study used online self-report measurements to assess childhood abuse, emotion dysregulation and NSSI. The online questionnaires and the lack of any experimental control have several shortcomings. Participants with emotion dysregulation might have showed a tendency to remember more childhood trauma due to an unconscious bias. Moreover, the completion of the questionnaires might have taken place in unstable environments (e.g., environmental noise, distractions, etc.) that could potentially affect the answers. Thus, future studies should include multiple methods and experimental controls such as clinical interviews. Thirdly, one of the inclusion criteria was age above 18, which hampered an investigation of a riskier early adolescence period. Therefore, future research should include younger participants in order to explore possible age differences in engaging in NSSI. Furthermore, possible comorbid disorders and medication use were not taken into account, which could affect the results. Lastly, the current study did not include a control group. However, the sample consisted of a very heterogenous group of individuals with and without NSSI, which facilitated within-sample comparisons. All in all, additional research with a prospective design and a stronger experimental control is needed.

The current study adds on to the literature by comprehensively investigating childhood abuse, cognitive emotion dysregulation and NSSI in the same model. The findings underline the pivotal role of childhood emotional abuse compared to other abuse subtypes, which makes it crucial to focus also on emotional aspect of abuse when treating NSSI. Results shed light on the processes underlying the relationship between childhood abuse and NSSI and point towards cognitive emotion dysregulation as a mediator in this relationship. Therefore, the results provide a deeper understanding about the maladaptive cognitive processes in emotion

regulation, and thereby about treatment of NSSI. Maladaptive cognitive emotion regulation strategies (i.e., Rumination, Catastrophizing, Self-blame and Other-blame) are likely related to intrapersonal functions of NSSI, which help maintain this behavior in long term. Thus, it might be beneficial to pay attention to both Cognitive-Behavioral Therapy and emotion dysregulation to prevent and treat NSSI, especially in younger populations.



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