**Title**

Derealisation and self-harm strategies are used to regulate disgust, fear and sadness in adult survivors of childhood sexual abuse

**Brief Title**

Self-harm, derealisation and PTSD

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**ABSTRACT**

Emotion regulation (ER) difficulties have been identified as an important target for clinical intervention in the treatment of posttraumatic stress disorder (PTSD) symptoms in survivors of childhood sexual abuse (CSA). However, there is limited research regarding the use of specific strategies to regulate specific emotions following exposure to traumatic events. The aim of the current study was to investigate the indirect effects of four trauma-related emotions (anger, sadness, disgust and fear) on PTSD severity via two mediators; derealisation and self-harm. In particular, we tested if the two hypothetical mediators operate sequentially, derealisation precedes self-harm and/or self-harm precedes derealisation. A predominately female clinical sample (N=109) of CSA survivors completed measures of experience of emotions, emotion regulation and post-traumatic stress. Bivariate and serial mediation analyses were conducted to test the direct and indirect effects of trauma-related emotions on PTSD severity. Serial mediation analyses indicated there were significant total effects of all trauma-related emotions on PTSD severity. Three trauma-related emotions (sadness, disgust and fear) were indirectly associated to PTSD severity via derealisation and self-harm and via self-harm and derealisation. Results indicate that difficulties in regulating the emotions of sadness, disgust and fear may result in more severe derealisation and self-harm as coping strategies which in turn lead to greater PTSD severity. The sequence of mediators does not hold great importance in these pathways. Overall, our findings suggest that therapeutically targeting derealisation and self-harm might enable the reduction of PTSD among CSA survivors.

**Keywords**: CSA, emotion regulation, emotions, derealisation, self-harm, PTSD

**Key Practitioner Message**

* Adults who have experienced childhood sexual abuse attempt to regulate emotions by using predominantly intrapersonal dysfunctional emotional regulation strategies such as self-harm, rumination, negative social comparison, repression and derealisation.
* Difficulties in regulating the emotions of sadness, disgust and fear may result in more severe derealisation and self-harm as coping strategies, which in turn lead to greater PTSD severity.
* Promoting functional emotional regulation strategies to increase positive emotions may enable CSA survivors to reduce their use of derealisation and self-harm as coping strategies and prepare them for subsequent trauma work.

**INTRODUCTION**

Childhood sexual abuse (CSA) is associated with a wide range of negative outcomes, including increased risk for development and maintenance of posttraumatic stress disorder **(**PTSD) symptoms. PTSD following CSA has been associated with a wide range of traumarelated emotions (e.g. anger, sadness, disgust, fear, shame and guilt) as well as impairments in the ability to regulate these emotional states (Badour, Resnick & Kilpatrick, 2015; Coyle, Karatzias, Summers, & Power, 2014; Görg et al., 2017). Emotion regulation (ER) difficulties in trauma survivors have received increasing attention among researchers and clinicians. A large body of research has focused on how emotion regulation strategies mediate types of trauma and PTSD (e.g. Ehring & Quack, 2010; Ullman, Peter-Hagene, & Relyea 2014), however, the association between emotions and emotion regulation strategies in PTSD has been less studied in CSA samples.

ER refers to the intrinsic and extrinsic processes involved in monitoring, evaluating, and modifying emotions in order to accomplish one's goals (Thompson, 1994). Individuals with PTSD may over-utilise relatively ineffective ER strategies (Boden et al., 2013), which could hinder recovery from PTSD symptoms (Bardeen, Kumpula & Orcutt, 2013). Specific maladaptive/ dysfunctional ER strategies have been associated with greater PTSD severity including rumination, thought suppression, experiential avoidance and expressive suppression (Seligowski, Lee, Bardeen, & Orcutt, 2015; Aldao, Nolen-Hoeksema & Schweizer, 2010). Given that individuals tend to use multiple ER strategies at any given time to manage emotions (Brans, Koval, Verduyn, Lim, & Kuppens, 2013), it remains unclear whether certain multiple distinct ER strategies play a more central role in psychopathology in CSA survivors. In order to improve treatment outcomes for CSA survivors with PTSD, it appears important to better understand the processes mediating the link between emotions and PTSD.

Dissociation has been the subject of much debate regarding how it functions as a regulatory strategy in people with psychological trauma. Both dissociation and emotion regulation strategies have been found to mediate the association between childhood trauma and PTSD separately (e.g. Louison Vang, Shevlin, Karatzias, Fyvie & Hyland 2018; Kratzer et al., 2017; John, Cisler, & Sigel, 2017). Dissociation is regarded as a dysfunctional ER strategy, i.e. dissociation prevents trauma-exposed individuals from processing their traumatic memories and therefore maintaining PTSD symptoms (Brier 2006; Briere, Scott, & Weathers, 2005; Wagner & Linehan 1998; Van der Kolk et al., 1996). Others view dissociation as a regulatory strategy that falls in the category of over-modulation of emotions (Lanuis et al., 2010), whereas Ford (2013) supports dissociation as a biologically based self-regulatory response to fear and other extreme emotions. In the current study, we focused on the dissociative symptoms of derealisation (a dissociative subtype of PTSD; American Psychiatric Association, 2013). Derealisation is characterised by “experience of unreality, distance, or distortion (e.g., ‘things are unreal, dreamlike, foggy, lifeless, or visually distorted”; American Psychiatric Association, 2013).

Self-harm (SH) is conceptualised as a maladaptive/dysfunctional emotion regulation strategy (Gratz, 2003; In-Albon, Burli, Ruf & Schmid, 2013; Mikolajczak, Petrides & Hurry, 2009). SH is often performed with the intent to temporarily ease intense negative emotions or may serve to express self-directed anger or disgust and end periods of dissociation or depersonalization (Klonsky & Muehlenkamp, 2007). A meta-analysis of 50 studies provides clear evidence on the association between suicide attempts/ self-injury and PTSD (Krysinska & Lester, 2010). CSA has been found to be a risk factor for suicide and non-suicidal self-injury (e.g. Maniglio, 2011). Survivors of CSA, and especially women, are almost four times more likely to self-harm (Noll, Horowitz, Bonanno, Trickett & Putnam, 2003; Romans, Martin, Anderson, Herbison, & Mullen, 1995). In a meta-analysis of 43 studies investigating the association between CSA and self-harm, a small association was established, which became negligible or disappeared when controlling for psychiatric risk factors, such as dissociation, alexithymia, and depression. Klonsky & Moyer (2008) suggest that there may not be a direct link from CSA to SH, but rather a complex relationship between CSA, psychiatric risk factors and SH. There is clearly a need for further research in the area.

It has been suggested that childhood abuse might lead to both dissociation and the tendency to SH (Van der Kolk, Perry and Herman, 1991). Brodsky, Cloitre & Dulit (1995), suggesting that SH may arise directly as a response to dissociative experiences. SH behaviour may be used to enable disruption of a dissociative state by providing a physical anchor for the individual to focus on and to help them return themselves to their current experience (Batey, May & Andrade; 2010). However, with a few exceptions (e.g. Bolen, Winter & Hodges, 2013), there is a surprising lack of research investigating emotion regulation strategies of dissociation and SH among treatment-seeking adults with CSA histories and PTSD. To address this gap, the primary aim of this current study was to determine if derealisation and self-harm would sequentially mediate the association between individual trauma-related emotions (anger, sadness, disgust and fear) and PTSD severity. At the bivariate level, we hypothesised that PTSD severity, dysfunctional intrapersonal emotion regulation strategies and negative emotions would all be positively related. At the multivariate level, we proposed that each trauma-related emotion leads to PTSD severity via a sequential mediating pathway of derealisation and self-harm. The sequence of mediators would be of great importance; therefore, we hypothesised that derealisation precedes self-harm in its association with trauma-related emotions and PTSD severity.

**METHODS**

*Participants and procedure*

Participants (n= 109; 78% female) in this study were individuals who were referred by general practitioners, psychiatrists or psychologists to a National Health Service (NHS) trauma centre in Scotland. All participants were sent a letter and invited to complete a set of standardised measures prior to start of treatment. Participation was voluntary and anonymous. Ethical approval was granted by the appropriate Ethics Committee. Age range of participants was 18 to 78 years (M=34, SD= 11.8). The majority were born in the United Kingdom (90.8 %) and were Scottish (78.9%). The highest level of academic attainment varied from basic education (38.5%) to higher education (45.8 %). More than half were unemployed (57.8%) single/ divorced (59.6%). Approximately one-third of the participants were living alone (33.9%)

 [Insert Table 1]

Measures

PTSD Checklist-Civilian Version (PCL-C; Weathers, Litz, Herman, Huska & Keane, 1993) consists of 17 items which correspond to the DSM-IV diagnostic criteria for posttraumatic stress (i.e. re-experience of the traumatic memory, avoidance of the reminders and hyperarousal). Participants identify how often they have been troubled by each symptom in the past month on a 5 point Likert scale (from 1 "Not at all" to 5 "Extremely"). Reliability and validity have been demonstrated for clinical populations (Blanchard, Jones-Alexander, Buckley & Forneris, 1996; Weathers et al., 1993). In the present study, satisfactory levels of internal consistency were found for the total PTSD, (α=.90) and the subscales (Intrusion α=.86, Avoidance α=.79 and Hyperarousal α=.72).

Basic Emotions Scale (BES; Power, 2006) is a three-part questionnaire, which assesses basic state emotions (experienced over the last week) and trait emotions (experienced “in general”) and one’s ability to cope with each of the 21 emotion terms listed. Each part of the BES uses a seven-point Likert scale from 1 indicating ‘never', 4 indicating ‘sometimes’, and 7 indicating ‘very often’. The 21 emotions can be reduced to five subscales, which correspond to the five basic emotions (Anger, Sadness, Disgust, Fear and Happiness) as described by Oatley and Johnson-Laird (1987) and Power and Dalgleish (1997). Excellent internal reliability and discriminant group validity have been indicated in a sample of outpatients with anxiety and depression (Power & Tarsia, 2007). The state version of the Basic Emotions Scale was included in this study’s analysis. In the present study, satisfactory levels of internal consistency were found for each of the sub-scales, (anger α =.77, sadness α =.78, disgust α =.90, fear α =.84, happiness, α =.92).

Regulation of Emotions Questionnaire (REQ: Phillips & Power 2007) is a 21 item self-report measure which categorises emotion regulation strategies as functional or dysfunctional (in relation to acceptance or rejection of emotional state). The REQ asks respondents to rate how often, in general, they engage in the use of the strategies in response to their emotions on a five-point Likert Scale (1= Never, 2=Seldom, 3= Often, 4=Very Often, 5= Always). The items draw onto four subscales; intrapersonal functional/ dysfunctional regulatory strategy (e.g., cognitive change) and interpersonal functional/ dysfunctional regulatory strategy (e.g., environmental change). The validity of this measure was supported in a study with adolescents (Philips & Power, 2007). The mediating variables were derived from the dysfunctional intrapersonal subscale. In the present study, satisfactory levels of internal consistency were found for each of the sub-scales, Intrapersonal dysfunctional α=.62, Intrapersonal functional α =.68, Interpersonal dysfunctional α =.86 and Interpersonal functional α =.81.

*Data Analysis*

All statistical analyses were performed using the Statistical Package for Social Sciences (SPSS) version 22. Descriptive statistics were first computed to describe the research sample. A series of one-way repeated measures analysis of variance (ANOVA) were undertaken to explore significant differences on emotions and emotion regulation. A Bonferroni correction was applied to control for the increased risk of a Type 1 error associated with multiple testing. To test the hypothesis that self-harm and derealisation were significant predictors of PTSD severity, we ran two linear regression models. For the first model, PTSD severity was the dependent variable with emotion regulation subscales as predictors (Intrapersonal dysfunctional, Intrapersonal functional, Interpersonal dysfunctional, Interpersonal functional). For the second linear regression model, PTSD severity remained the dependent variable with Intrapersonal dysfunctional variables as the predictors (self-harm, rumination, negative social comparison, repression and derealisation). Partial correlational analysis was conducted to assess the bivariate relationship of all variables in the path models.

Serial multiple mediation models were tested using PROCESS v2 macro (Hayes 2013). We constructed a number of serial multiple mediator models to test whether individual trauma-related emotions affect PTSD severity through two proposed mediators (i.e. derealisation and self-harm). This procedure allowed for all mediators to be examined concurrently and allowed us to estimate the specific indirect effect for each mediator and the total indirect effect. Indirect effects were interpreted as significant when the bias-corrected confidence interval does not include zero (Mallinckrodt, Abraham, Wei, & Russell, 2006; Preacher & Hayes, 2008). To identify the importance of sequence between the mediators, the first four models investigated the effects of individual trauma-related emotions (anger, sadness, disgust and fear) on PTSD severity through a sequential path of derealisation preceding self-harm. The order of sequential mediators was exchanged, i.e. self –harm precedes derealisation. Age, gender and education were entered as a covariate in the serial mediation models. Previous research has shown men and women show differences in the age distribution of PTSD prevalence during their lifespan and there is a link between less education and greater PTSD severity (Kessler, Sonnega, Bromet, Hughes, Nelson 1995; Ullman & Filipas, 2001).

**RESULTS**

*Preliminary analyses*

Means (SD) and Pearson r correlations for all variables are presented in Table 1 and 2. One-way repeated ANOVAs demonstrated a significant difference between the frequency of experience of the basic state emotions [F (4,105) =51.01, p<.001, n2 =.66]. Post hoc tests using the Bonferroni correction demonstrated that significantly higher levels of state disgust (M=23.34 SD= 8.34; p<0.01) were reported compared to all other emotions. Further analysis demonstrated a significant difference between the use of intrapersonal dysfunctional strategies [F (4,150) =50.52, p<.001, n2 =.66]. Post hoc tests using the Bonferroni correction demonstrated that significantly higher levels of rumination were reported compared to other emotion regulation strategies (M=4.44 SD= .81; p=<0.01). Overall, CSA survivors reported significantly higher emotional experiences of disgust. The most prevalent emotion regulation strategy reported was rumination.

Linear regression analyses were performed to assess emotion regulation strategies (intrapersonal dysfunctional, intrapersonal functional, interpersonal dysfunctional, and interpersonal functional) as predictors of PTSD severity. Intrapersonal dysfunctional emotional regulation strategies were found to be uniquely related with PTSD severity (β=0.47, p<.001). A further linear regression was performed to assess dysfunctional intrapersonal strategies on the likelihood of predicting PTSD severity. Self-harm (β=.30 p=<.005), repression (β=.20, p=<.05) and derealisation strategies (β=.21, p=<.05) were found to be uniquely related with PTSD severity (see Table 2).

All study variables were significantly associated in the predicted directions, supporting our bivariate hypothesis (see Table 3). PTSD symptomatology was positively correlated with all dysfunctional intrapersonal emotion regulation strategies apart from negative social comparison and the following negative emotions, i.e. anger, sadness, disgust and fear. These negative emotions were positively correlated with self-harm, negative social comparison and derealisation strategies. Self-harm was shown to have a stronger association with derealisation (r =.42, p<0.01). All correlations among these measures were small to moderate strength (r values ranged from -.032 to .541).

[Insert Table 2]

[Insert Table 3]

*Multiple mediation analyses*

We first examined the association between each individual trauma related emotions (anger, sadness, disgust and fear) on PTSD severity with the sequential path of derealisation and self-harm; followed by another sequential path of self-harm and derealisation. All serial multiple mediation models results are summarised in Table 4. In each model, age, gender and education were entered as covariates. Point estimates, standard errors and bootstrapped 95% CI for the total indirect effect and specific indirect pathways are provided in Table 5.

[Insert Figure 5]

[Insert Figure 6]

*Sadness*

In the first serial mediation analysis (see Figure 1), a significant total and direct effect for trauma related sadness on PTSD severity was observed, via derealisation and self-harm (c2 = 1.433, CI =.968 to 1.897, p =<.001; c′2 = .946, CI =.457 to 1.435, p = <.001). The mediational analysis indicated that the total indirect effect and three specific indirect effects were significant (see Table 5). The total indirect effect of disgust on PTSD severity was statistically significant (point estimate=.464, SE= .160, CI=.185 to .821). The indirect path of sadness through derealisation alone (point estimate= .239, SE=.137 CI=.001 to .536) was statistically significant. The indirect effect of sadness on PTSD severity via derealisation and self-harm was also significant (point estimate=.081, SE=.047, CI=.020 to .222). This model indicates greater experience of sadness is sequentially associated with increased levels of derealisation and increased levels self-harm which in turn is linked to greater PTSD severity. The indirect pathway for disgust through self-harm alone was statistically significant (point estimate =.144, SE=.080, CI=.026 to .351).

Figure 2 presents the effects of sadness on PTSD severity through a sequential path of self-harm followed by derealisation. In this model the order of the sequential mediators was exchanged. The indirect effect of sadness on PTSD severity via self- harm and derealisation was significant (point estimate =.064, SE=.050, CI=.006 to .218). This model indicates greater experience of sadness is sequentially associated with increased levels of self-harm and increased levels of derealisation which in turn is linked to greater PTSD severity. As a result, the order of the proposed mediators in these two model of sadness to PTSD severity (Fig 1 &2) does not hold great importance.

[Insert Figure 1]

[Insert Figure 2]

*Disgust*

In the third serial mediation analysis (see Figure 3 ), a significant total and direct effect for trauma related disgust on PTSD severity was observed, via derealisation and self-harm (c3 = .749, CI =.465 to 1.033, p =<.001; c′3 = .392, CI =.074 to .710, p = <.005). This mediational analysis also produced a significant total indirect effect and three specific indirect effects. The total indirect effect of disgust on PTSD severity was statistically significant (point estimate=.358, SE= .122, CI=.145 to .624). The indirect effects for all paths of the disgust – PTSD relationship were statistically significant. The indirect path of sadness through derealisation alone (point estimate= .183, SE=.090 CI=.040 to .388) was statistically significant. The indirect effect of disgust on PTSD severity via derealisation and self-harm was also significant (point estimate=.036, SE=.024, CI=.006 to .110). This model indicates greater experience of disgust is sequentially associated with increased levels of derealisation and increased levels self-harm which in turn is linked to greater PTSD severity. The indirect pathway for disgust through self-harm alone was statistically significant (point estimate =.139, SE=.069, CI=.028 to .309).

Figure 4 presents the effects of disgust on PTSD severity through a sequential path of self-harm followed by derealisation. The indirect effect of disgust on PTSD severity via self- harm and derealisation was significant (point estimate =.057, SE=.038, CI=.008 to .167). Yet again, the order of the proposed mediators in these two model of disgust to PTSD severity (Fig.3 & 4) does not hold great importance.

 [Insert Figure 3]

[Insert Figure 4]

*Fear*

In the fifth serial mediation analysis (see Figure 5), a significant total and direct effect for trauma related fear on PTSD severity was observed, (c4 =1.416, CI =.911 to 1.920, p =<.001; c′4= .939, CI =.438 to 1.440, p = <.001). The total indirect effect and two specific indirect effects were significant. The total indirect effect of fear on PTSD severity was statistically significant (point estimate=.469, SE= .169, CI=.198 to .868). The indirect path of fear through derealisation alone (point estimate = .253, SE=.141 CI=.041 to .598) was statistically significant. The indirect effect of fear on PTSD severity via derealisation and self-harm was also significant (point estimate =.098, SE=.052, CI=.030 to .258). This model indicates greater experience of sadness is sequentially associated with increased levels of derealisation and increased levels self-harm which in turn is linked to greater PTSD severity. The indirect pathway for fear through self-harm alone was not statistically significant (point estimate =.118, SE=.080, CI=.-.009 to .324).

Figure 6 presents the effects of fear on PTSD severity through a sequential path of self-harm followed by derealisation. The indirect effect fear on PTSD severity via self- harm and derealisation was significant (point estimate =.067, SE=.041, CI=.015 to .193). This model indicates greater experience of fear is sequentially associated with increased levels of self – harm followed by increased levels of derealisation which in turn is linked to greater PTSD severity. Gender was a significant covariate (p<.050) in both models. It is interested to note that the indirect path for fear through self-harm was statistically significant (point estimate =.215, SE=.097, CI=.065 to .460) with this sequential of mediators therefore the proposed mediators in these two model of fear to PTSD severity (Fig.5 & 6) does hold great importance.

*Anger*

Lastly, in the serial mediation analyses investigating the association of anger and PTSD severity, the total direct effect of anger and PTSD severity was not significant in both sets of mediators.

 [Insert Table 4]

[Insert Table 5]

**DISCUSSION**

The purpose of the current study was to investigate the indirect effects of four trauma-related emotions (anger, sadness, disgust and fear) on PTSD stress severity amongst CSA survivors, with particular regard to the sequential mediating roles of derealisation and self-harm. This was achieved through a series of serial multiple mediation analyses. Preliminary analysis revealed that the CSA sample in this study experienced significantly higher levels of disgust (Coyle et al., 2013, Power & Dalgleish, 2008; Power & Fyvie, 2013). The most prevalent intrapersonal dysfunctional emotion regulation strategy reported in the current study was rumination. Our results are in line with those of Ehring & Ehlers (2014) suggesting that difficulties regulating negative emotions following trauma may prompt trauma survivors to engage in trauma-related rumination to cope with their experience.

We found support for our two hypotheses. Firstly, the bivariate correlations results revealed all negative emotions were significantly correlated with PTSD. This finding is consistent with earlier findings showing a close association between negative emotions and PTSD among CSA survivors (Badour, Resnick & Kilpatrick 2015; Coyle et al., 2014; Görg et al., 2017). It was found that sadness most strongly correlated with PTSD severity. All negative emotions displayed significant associations to each of the mediators. These findings are consistent with the suggestion that trauma-related emotions might lead to self-harm (Smith, Kouros, and Meuret; 2014) and dissociation (Briere, Scott, & Weathers, 2005). The results from the mediating variables to PTSD severity also displayed significant associations. These findings are consistent with previous research in the area (Smith et al., 2014; Franzke, Wabnitz, & Catani, 2015; Kratzer et al., 2017; Marx & Sloan, 2005).

 With regard to our second hypothesis, our findings suggest that difficulties in regulating three trauma-related emotions of sadness, disgust and fear may result in more severe derealisation and subsequent self-harm as coping strategies, which in turn can lead to greater PTSD severity. Our results are in line with theoretical explanations and research findings in this area. It has been suggested that self- harm can directly disrupt a dissociative experience by using physical pain as a stimulus to combat feelings of numbness, emptiness, depersonalization, or derealisation. Self-harm can also help the individual escape from uncomfortable posttraumatic symptoms and reduce aversive feelings and negative emotions (Brodsky, Cloitre & Dulit, 1995; Batey, May & Andrade; 2010; Klonsky, Oltmanns, Turkheimer, 2003; Smith et al., 2014). Nevertheless, our findings also support alternative sequencing of these mediators. We found, for example, that CSA survivors may use self-harm followed by derealisation to regulate trauma-related sadness, disgust and fear. It is also interesting to note that anger and PTSD severity did not demonstrate any total direct serial multiple mediation effects. Our findings are in line with previous research in this areas (Andrews, Brewin, Rose, & Kirk, 2000; Zoellner, Foa, & Brigidi, 1999). Anger was found the least reported negative emotion. It has been suggested that CSA survivors may impede the expression of anger as a result of fear of interpersonal rejection (Luterek, Harb, Heimberg, Marx; 2004).

These conceptual pathways have important implications for clinical practice aiming to reduce PTSD severity. A clinical implication of our findings is that difficulties regulating negative emotions are a potent risk factor to PTSD severity related to CSA. Derealisation and self-harm, both individually and conjointly, can be targeted for PTSD treatment in adults survivors of CSA. Interventions such as Skills Training in Affect Regulation (STAIR) and Dialectical Behaviour Therapy for PTSD (DBT-PTSD) have been found helpful for those with severe emotion regulation difficulties (Steil et al., 2018; Steil, Jung, Stangier, 2011; Bohus et al., 2013; Cloitre et al., 2002, 2012; MacIntosh et al., 2016). DBT and prolonged exposure (DBT +PE) has also been recently found effective for the treatment of dissociation, self-harm and PTSD symptoms for those with trauma histories. Whilst such intervention are effective for CSA survivors with PTSD, our findings provide support for the usefulness of equipping survivors with emotion regulation skills prior to embarking on cognitive behaviour therapy for PTSD (Bryant’s et al., 2013). Promoting functional emotional regulation strategies (e.g. positive re-appraisal, modification of goals, planning, perspective, and concentration) to increase positive emotions can enable CSA survivors to reduce their use of derealisation and self-harm as coping strategies and prepare them for subsequent trauma work.

This study has several limitations including its cross-sectional nature prohibiting the conclusion of causal relationships. Future work should focus on the exploration of the causal relationships between trauma-related emotions, emotion regulation difficulties and PTSD using longitudinal or prospective designs. The predominately-female sample, who are CSA survivors, also limits the generalizability of findings to the wider trauma population. Furthermore, all measures were self – reported rather clinician-administered interviews. Finally, it is important to mention that the mediating variables were based on single item questions. Notwithstanding its limitations, this is the first study to explore the use of specific strategies to regulate specific emotions following exposure to traumatic events. Our results suggest targeting derealisation and self-harm sequentially during therapy may be useful to reduce PTSD severity among CSA survivors.

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**Table 1**

Demographic and population characteristics, and means, standard deviations of PTSD and emotion regulation scales (N=109).

|  |  |  |
| --- | --- | --- |
| Variables | Level/units | Mean or N (SD or %) |
| Age  |  | 35.5 (9.9) |
|  |  |  |
| Gender | Male  |  15 (13.8%) |
|  | Female  | 85 (78%) |
|  | Missing values  |  9 (8.2%) |
|  |  |  |
| Education | Basic education  |  42 (38.5%) |
|  | Higher education |  50(45.8%) |
|  | Missing values | 17 (15.6%) |
|  |  |  |
| Employment | Full/part-time  | 40 (36.7%) |
|  | Unemployed/retired/other | 63 (57.8%) |
|  | Missing values | 6 (5.5%) |
|  |  |  |
| Marital status  | Married/cohabiting  | 37 (35.0%) |
|  | Divorced/single | 65 (59.6%) |
|  | Missing values | 7 (6.4%) |
|  |  |  |
| Living arrangements | Alone | 37 (33.9%) |
|  | With others | 66 (60.6%) |
|  | Missing values | 6 (5.5%) |
|  |  |  |
| PTSD symptoms  | Intrusion  | 18.23 (4.93) |
|  | Avoidance | 25.58 (5.96) |
|  | Hyperarousal  | 18.08 (4.35) |
|  |  |  |
| Emotion Regulation strategies | Intrapersonal Dysfunctional | 3.5 (0.7) |
|  | Intrapersonal Functional  | 2.5 (0.7) |
|  | Interpersonal Dysfunctional | 2.1 (0.9) |
|  | Interpersonal Functional  | 2.3 (0.8) |

**Table 2.**

Unstandardized (standard error) and standardized beta values for the predictors of symptoms of PTSD severity

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Unstandardized coefficients | Standardized coefficients |  |  |
| Predicting PTSD severity  | **β** | **SE** | **β** | **t** | **p** | **[95.0% C.I]** |
|  |  |  |  |  |  |  |
| Intrapersonal Dysfunctional | 8.40 | 1.55 | .47 | 5.42 | .000 | [5.33, 11.47] |
| Intrapersonal Functional  | 1.68 | 1.78 | .09 | 0.94 | .349 | [-1.86, 5.21] |
| Interpersonal Dysfunctional | 2.68 | 1.23 | .19 | 2.17 | .032 | [0.24, 5.13] |
| Interpersonal Functional  | -1.68 | 1.60 | -.09 | -1.05 | .296 | [-4.84, 1.49] |
|  |  |  |  |  |  |  |
| Predicting PTSD severity |  |  |  |  |  |  |
|  |  |  |  |  |  |  |
| Self-Harm | 2.88 | 0.91 | .30 | 3.15 | .002 | [1.06, 4.69] |
| Rumination | 1.48 | 1.46 | .09 | 1.01 | .313 | [-1.42, 4.38] |
| Negative social comparison  | 0.35 | 0.89 | .03 | 0.39 | .701 | [-1.43, 2.12] |
| Repression  | 2.51 | 1.04 | .20 | 2.41 | .018 | [0.44, 4.57] |
| Derealisation  | 2.37 | 1.14 | .21 | 2.08 | .040 | [0.12, 4.63] |

Note: PTSD = posttraumatic stress disorder; β = unstandardized beta values; β = standardized beta value; SE = standard error; p = statistical significance; inside square brackets are 95 % confidence interval for B.

**Table 3**

Means, standard deviations, and partial correlations of PTSD, trauma, dysfunctional intrapersonal emotion regulation strategies and basic emotions (state) (controlling for age, gender and education)

|  |  |  |  |
| --- | --- | --- | --- |
|  | Descriptives  |  | Correlations |
| Variables  | Mean  | Std. dev | 1 | 2 | 3 | 4 | 5 | 6 |
| 1. PCL-C PTSD  | 61.29 | 13.45 |  | - |  |  |  |  |  |
| 2. REQ ID Self-harm |  2.69 |  1.36 |  | .464\*\* | - |   |   |   |   |
| 3. REQ ID. Rumination |  4.43 |  0.83 |  | .262\* |  .092 | - |  |  |  |
| 4. REQ ID NSC |  2.76 | 1.34 |  | .187 |  .284\*\* |  .240\* | - |  |  |
| 5. REQ ID Repression |  3.88 | 1.07 |  | .292\*\* |  .098 |  .027 |  .052 | - |  |
| 6. REQ ID Derealisation |  3.39 | 1.18 |  | .473\*\* |  .417\*\* |  .339\*\* |  .257\* |  .255\* | - |
| 7. BES Anger | 18.34 | 4.79 |  | .329\*\* |  .316\*\* |  .197 |  .284\*\* |  .076 |  .229\* |
| 8. BES Sadness | 18.51 | 5.15 |  | .541\*\* |  .375\*\* |  .392\*\* |  .363\*\* |  .125 |  .426\*\* |
| 9. BES Disgust | 22.65 | 8.58 |  | .482\*\* |  .508\*\* |  .252\* |  .433\*\* |  .059 |  .427\*\* |
| 10.BES Fear | 22.02 | 4.71 |  | .504\*\* |  .309\*\* |  .320\*\* |  .238\* |  .107 |  .373\*\* |
| 11. BES Happiness | 13.05 | 4.89 |  | -.132 |  .001 |  -.158 |  -.069 |  -.032 |  -.018 |

Note: REQ ID: Regulation of Emotions QuestionnaireIntrapersonal Dysfunctional Emotion Regulation, NSC: Negative social comparison; BES: Basic Emotion Scale: \*\*p=0.01 (2 tailed) \*p=0.05 (2 tailed)

**Table 4**

Path coefficients of serial multiple mediation models predicting PTSD severity. Estimates of direct and indirect effects from the multiple mediation models.

|  |  |  |  |
| --- | --- | --- | --- |
|  | Derealisation (M1) → Self-Harm (M2) |  | Self-Harm (M1) → Derealisation (M2) |
|  |  | *β (SE)* | p | [95% CI] |  |  |  | *β (SE)* | p | [95% CI] |
|  |  |  |  |  |  |  |  |  |  |  |
| Anger to DR | a1 | .062 (.025) | .013 | [.014 .111] |  | Anger to SH | a9 | .092 (.028) | .001  | [.037 .146] |
| Anger to SH | a2 | .066 (.027) | .015 | [.013 .119] |  | Anger to DR | a10 | .033 (.024)  | .183  | [-.016 .081] |
| Effect of M1 and M2 | d1 | .410 (.109) | .000  | [.195 .626] |  | Effect of M1 and M2 | d5 | .324 (.086)  | .000  | [.154 .495] |
| DR to PTSD | b1 | 3.597 (1.082) | .001 | [1.448 5.746] |  | SH to PTSD | b9 | 2.716 (.958)  | .006 | [.812 4.620] |
| SH to PTSD | b2 | 2.716 (.958) | .006 | [.812 4.620] |  | DR to PTSD | b10 | 3.597 (1.082) | .001  | [1.448 5.746] |
| Total effect | c1 | .965 (.290) | .001  | [.389 1.542] |  | Total effect | c5 | .965 (.290) | .001 | [.389 1.542] |
| Total Direct effect | c’1 | .494 (.269) | .070 | [-.040 1.028] |  | Total Direct effect | c’5 | .494 (.269)  | .070 | [-.040 1.028] |
| Age |  | .245 (.115) | .036 | [.016 .474] |  | Age |  | .245 (.115)  | .036 | [.016 .474] |
| Gender  |  | -5.205 (3.200) | .107 | [-11.563 1.154] |  | Gender  |  |  -5.205 ( 3.200) | .107 | [-11.563 1.154] |
| Education |  | .157 ( 1.279) | .902 | [-2.384 2.699] |  | Education |  | .157 (1.279) | .902 | [-2.384 2.699] |
|  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |
| Sadness to DR | a3 | .095 (.021) | .000 | [.053 .138] |  | Sadness to SH | a11 | .097 ( .025)  | .000 | [.047 .147] |
| Sadness to SH | a4 | .062 (.027) | .022 | [.009 .115] |  | Sadness to DR | a12 | .070 (.022) | .002  | [.026 .114] |
| Effect of M1 and M2 | d2 | .365 (.116) | .002 | [.135 .596] |  | Effect of M1 and M2 | d6 | .264 ( .084) | .002  | [.098 .430] |
| DR to PTSD | b3 | 2.504 (1.070)  | .022 | [.377 4.630] |  | SH to PTSD | b11 | 2.321 (.902) | .012  | [.529 4.114] |
| SH to PTSD | b4 | 2.321 (.902) | .012 | [.529 4.114] |  | DR to PTSD | b12 | 2.504 (1.070) | .022 | [.377 4.630] |
| Total effect | c2 | 1.433 (.234) | .000 | [.968 1.897] |  | Total effect | c6 | 1.433 (.234) | .000 | [.968 1.897] |
| Total Direct effect | c’2 | .946 (.246)  | .000  | [.457 1.435] |  | Total Direct effect | c’6 | .946 (.246) | .000 | [.457 1.435] |
| Age  |  | .158 (.111) | .157 | [-.062 .379] |  | Age |  | .158 (.111) | .157 | [-.062 .379] |
| Gender  |  | -4.759 (3.017) | .118  |  [-10.752 1.235] |  | Gender |  |  -4.759 (3.017) | .118 |  [-10.752 1.235] |
| Education  |  | .210 (1.156) | .856 | [-2.086 2.507] |  | Education  |  | .210 ( 1.156) | .856 | [-2.086 2.507] |
|  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |
| Disgust to DR | a5 | .059 (.013)  | .000 |  [.034 .085] |  | Disgust to SH | a13 | .080 (.014)  | .000 | [.053 .108] |
| Disgust to SH | a6 | .064 (.015) | .000  | [.034 .094] |  | Disgust to DR | a14 | .041 (.014) | .005 | [.012 .070] |
| Effect of M1 and M2 | d3 | .276 (.110)  | .014 | [.058 .495] |  | Effect of M1 and M2 | d7 | .229 (.091) | .014  | [.048 .411] |
| DR to PTSD | b5 | 3.076 (1.102) | .006 | [.886 5.267] |  | SH to PTSD | b13 | 2.172 (.999)  | .032 | [.188 4.157] |
| SH to PTSD | b6 | 2.172 (.999) | .032  | [.188 4.157] |  | DR to PTSD | b14 | 3.076 (1.102) | .006 | [.886 5.267] |
| Total effect | c3 | .749 (.143) | .000  | [.465 1.033] |  | Total effect | c7 | .749 (.143)  | .000 | [.465 1.033] |
| Total Direct effect | c’3 | .392 (.160)  | .016  | [.074 .710] |  | Total Direct effect | c’7 | .392 (.160) | .016 | [.074 .710] |
| Age |  | .224 ( .114) | .052 | [-.002 .451] |  | Age |  | .224 (.114) | .052 | [-.002 .451] |
| Gender  |  | -5.015 (3.152) | .115 |  [-11.278 1.248] |  | Gender |  | -5.015 (3.152)  | .115 | [-11.278 1.248] |
| Education  |  | -.227 ( 1.197) | .850 | [-2.607 2.152] |  | Education  |  | -.227 (1.197) | .850 | [-2.607 2.152] |
|  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |
| Fear to DR | a7 | .094 (.024) | .000 | [.046 .141] |  | Fear to SH | a15 | .085 (.028)  | .004  | [.028 .141] |
| Fear to SH | a8 | .046 (.029 )  | .113  | [-.011 .104] |  | Fear to DR | a16 | .069 (.024) | .004 | [.022 .116] |
| Effect of M1 and M2 | d4 | .409 (.115)  | .001  | [.180 .639] |  | Effect of M1 and M2 | d8 | .291 (.082) | .001 | [.128 .454] |
| DR to PTSD | b7 | 2.705 (1.061)  | .013 | [.596 4.814] |  | SH to PTSD | b15 | 2.546 (.894) | .005 | [.769 4.323] |
| SH to PTSD | b8 | 2.546 (.894) | .005  | [.769 4.323] |  | DR to PTSD | b16 | 2.705 (1.061)  | .013  | [.596 4.814] |
| Total effect | c4 | 1.416 (.254) | .000  | [.911 1.920] |  | Total effect | c8 | 1.416 (.254)  | .000  | [.911 1.920] |
| Total Direct effect | c’4 | .939 (.252) | .000  | [.438 1.440] |  | Total Direct effect | c’8 | .939 (.252) | .000 | [.438 1.440] |
| Age |  | .211 (.110)  | .057  | [-.006 .429] |  | Age |  | .211 (.110) | .057 | [-.006 .429] |
| Gender  |  | -6.102 (3.045) | .048  | [-12.153 -.051] |  | Gender |  | -6.102 ( 3.045) | .048 | [-12.153 -.051] |
| Education  |  | -.847 (1.140) | .459 | [-3.113 1.418] |  | Education  |  | -.847 (1.140) | .459 | [-3.113 1.418] |
|  |  |  |  |  |  |  |  |  |  |  |

Note: SH self-harm, DR: derealisation

**Table 5**

Significant indirect effects

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Path  | Effect | SE | 95% CI |
| Fig. 1 | Total indirect effect  | .464  | .160  | [.185 .821] |
|  | Sadness→ DR→ PTSD  | .239  | .137  | [.001 .536] |
|  | Sadness→ DR→ SH → PTSD | .081  | .047  | [.020 .222] |
|  | Sadness →SH → PTSD | .144  | .080  | [.026 .351] |
|  | PTSD Severity Total Effect Model R2 = .328 |
|  |  |  |  |  |
| Fig.2  | Total indirect effect | .464 | .160  | [.198 .830] |
|  | Sadness→ SH→ PTSD  | .225 | .098  | [.072 .470] |
|  | Sadness → SH→ DR→ PTSD | .064 | .050  | [.006 .218] |
|  | Sadness →DR → PTSD | .175 | .110  | [.008 .437] |
|  | PTSD Severity Total Effect Model R2 = .328 |  |  |
|  |  |  |  |  |
| Fig.3  | Total indirect effect  | .358 | .122  | [.145 .624] |
|  | Disgust → DR→ PTSD  | .183 | .090  | [.040 .388] |
|  | Disgust → DR→ SH → PTSD | .036 | .024  | [.006 .110] |
|  | Disgust →SH → PTSD | .139 | .069  |  [ .028 .309] |
|  | PTSD Severity Total Effect Model R2 = .271 |  |  |
|  |  |  |  |  |
| Fig. 4  | Total indirect effect  | .358 | .125  | [.136 .627] |
|  | Disgust→ SH→ PTSD  | .175 | .082  | [.035 .363] |
|  | Disgust → SH→ DR → PTSD | .057 | .038  | [.008 .167] |
|  | Disgust →DR → PTSD | .126 | .075  | [.015 .317] |
|  | PTSD Severity Total Effect Model R2 =.271 |  |  |
|  |  |  |  |  |
| Fig.5 | Total indirect effect  | .469  | .169  | [.198 .868] |
|  | Fear→ DR→ PTSD  | .253  | .141  | [.041 .598] |
|  | Fear → DR→ SH → PTSD | .098  | .052  | [.030 .258] |
|  | Fear →SH → PTSD | .118  | .083  | [-.009 .324] |
|  | PTSD Severity Total Effect Model R2 = .292 |  |  |
|  |  |  |  |  |
| Fig.6  | Total indirect effect  | .469 | .169 | [.193 .859] |
|  | Fear → SH→ PTSD  | .215 | .097 | [.065 .460] |
|  | Fear → SH→ DR → PTSD | .067 | .041 | [.015 .193] |
|  | Fear →DR → PTSD | .187 | .118 | [.019 .484] |
|  | PTSD Severity Total Effect Model R2 =.292 |  |  |
|  |  |  |  |  |

Note: All path coefficients were derived from 10,000 bootstrap samples.

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**Fig.1.** Derealisation and self-harm ER strategies sequentially mediating the relationship between trauma-related sadness and PTSD severity. Unstandardized coefficients are displayed. Model covariate include education. \*p < .05, \*\*p < .01, \*\*\*p < .001

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**Fig. 2**. Self harm and derealisation ER strategies sequentially mediating the relationship between trauma-related sadness and PTSD severity. Unstandardized coefficients are displayed. Model covariate include education. \*p < .05, \*\*p < .01, \*\*\*p < .001



**Fig. 3**. Derealisation and self-harm ER strategies sequentially mediating the relationship between trauma-related disgust and PTSD severity. Unstandardized coefficients are displayed. Model covariate include education. \*p < .05, \*\*p < .01, \*\*\*p < .001



**Fig. 4**. Self harm and derealisation ER strategies sequentially mediating the relationship between trauma-related disgust and PTSD severity. Unstandardized coefficients are displayed. Model covariate include education. \*p < .05, \*\*p < .01, \*\*\*p < .001

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**Fig. 5**. Derealisation and self-harm ER strategies sequentially mediating the relationship between trauma-related fear and PTSD severity. Unstandardized coefficients are displayed. Model covariate include education. \*p < .05, \*\*p < .01, \*\*\*p < .001



**Fig. 6**. Self harm and derealisation ER strategies sequentially mediating the relationship between trauma-related fear and PTSD severity. Unstandardized coefficients are displayed. Model covariate include education. \*p < .05, \*\*p < .01, \*\*\*p < .001