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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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1 **ABSTRACT**

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

22

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

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25

1 **Key Practitioner Message**

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

11

12 **INTRODUCTION**

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

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

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

Derealisation, self-harm and PTSD

1 distance, or distortion (e.g., ‘things are unreal, dreamlike, foggy, lifeless, or visually
2 distorted’; American Psychiatric Association, 2013).

3 Self-harm (SH) is conceptualised as a maladaptive/dysfunctional emotion regulation
4 strategy (Gratz, 2003; In-Albon, Burli, Ruf & Schmid, 2013; Mikolajczak, Petrides & Hurry,
5 2009). SH is often performed with the intent to temporarily ease intense negative emotions or
6 may serve to express self-directed anger or disgust and end periods of dissociation or
7 depersonalization (Klonsky & Muehlenkamp, 2007). A meta-analysis of 50 studies provides
8 clear evidence on the association between suicide attempts/ self-injury and PTSD (Krysinska
9 & Lester, 2010). CSA has been found to be a risk factor for suicide and non-suicidal self-
10 injury (e.g. Maniglio, 2011). Survivors of CSA, and especially women, are almost four times
11 more likely to self-harm (Noll, Horowitz, Bonanno, Trickett & Putnam, 2003; Romans,
12 Martin, Anderson, Herbison, & Mullen, 1995). In a meta-analysis of 43 studies investigating
13 the association between CSA and self-harm, a small association was established, which
14 became negligible or disappeared when controlling for psychiatric risk factors, such as
15 dissociation, alexithymia, and depression. Klonsky & Moyer (2008) suggest that there may
16 not be a direct link from CSA to SH, but rather a complex relationship between CSA,
17 psychiatric risk factors and SH. There is clearly a need for further research in the area.

18 It has been suggested that childhood abuse might lead to both dissociation and the
19 tendency to SH (Van der Kolk, Perry and Herman, 1991). Brodsky, Cloitre & Dulit (1995),
20 suggesting that SH may arise directly as a response to dissociative experiences. SH behaviour
21 may be used to enable disruption of a dissociative state by providing a physical anchor for the
22 individual to focus on and to help them return themselves to their current experience (Batey,
23 May & Andrade; 2010). However, with a few exceptions (e.g. Bolen, Winter & Hodges,
24 2013), there is a surprising lack of research investigating emotion regulation strategies of
25 dissociation and SH among treatment-seeking adults with CSA histories and PTSD. To

1 address this gap, the primary aim of this current study was to determine if derealisation and
2 self-harm would sequentially mediate the association between individual trauma-related
3 emotions (anger, sadness, disgust and fear) and PTSD severity. At the bivariate level, we
4 hypothesised that PTSD severity, dysfunctional intrapersonal emotion regulation strategies
5 and negative emotions would all be positively related. At the multivariate level, we proposed
6 that each trauma-related emotion leads to PTSD severity via a sequential mediating pathway
7 of derealisation and self-harm. The sequence of mediators would be of great importance;
8 therefore, we hypothesised that derealisation precedes self-harm in its association with
9 trauma-related emotions and PTSD severity.

10

11 **METHODS**

12 *Participants and procedure*

13 Participants (n= 109; 78% female) in this study were individuals who were referred by
14 general practitioners, psychiatrists or psychologists to a National Health Service (NHS)
15 trauma centre in Scotland. All participants were sent a letter and invited to complete a set of
16 standardised measures prior to start of treatment. Participation was voluntary and anonymous.
17 Ethical approval was granted by the appropriate Ethics Committee. Age range of participants
18 was 18 to 78 years (M=34, SD= 11.8). The majority were born in the United Kingdom (90.8
19 %) and were Scottish (78.9%). The highest level of academic attainment varied from basic
20 education (38.5%) to higher education (45.8 %). More than half were unemployed (57.8%)
21 single/ divorced (59.6%). Approximately one-third of the participants were living alone
22 (33.9%)

23

[Insert Table 1]

24

1 Measures

2 PTSD Checklist-Civilian Version (PCL-C; Weathers, Litz, Herman, Huska & Keane,
3 1993) consists of 17 items which correspond to the DSM-IV diagnostic criteria for
4 posttraumatic stress (i.e. re-experience of the traumatic memory, avoidance of the reminders
5 and hyperarousal). Participants identify how often they have been troubled by each symptom
6 in the past month on a 5 point Likert scale (from 1 "Not at all" to 5 "Extremely"). Reliability
7 and validity have been demonstrated for clinical populations (Blanchard, Jones-Alexander,
8 Buckley & Forneris, 1996; Weathers et al., 1993). In the present study, satisfactory levels of
9 internal consistency were found for the total PTSD, ($\alpha=.90$) and the subscales (Intrusion
10 $\alpha=.86$, Avoidance $\alpha=.79$ and Hyperarousal $\alpha=.72$).

11 Basic Emotions Scale (BES; Power, 2006) is a three-part questionnaire, which
12 assesses basic state emotions (experienced over the last week) and trait emotions
13 (experienced "in general") and one's ability to cope with each of the 21 emotion terms listed.
14 Each part of the BES uses a seven-point Likert scale from 1 indicating 'never', 4 indicating
15 'sometimes', and 7 indicating 'very often'. The 21 emotions can be reduced to five subscales,
16 which correspond to the five basic emotions (Anger, Sadness, Disgust, Fear and Happiness)
17 as described by Oatley and Johnson-Laird (1987) and Power and Dalgleish (1997). Excellent
18 internal reliability and discriminant group validity have been indicated in a sample of
19 outpatients with anxiety and depression (Power & Tarsia, 2007). The state version of the
20 Basic Emotions Scale was included in this study's analysis. In the present study, satisfactory
21 levels of internal consistency were found for each of the sub-scales, (anger $\alpha =.77$, sadness α
22 $=.78$, disgust $\alpha =.90$, fear $\alpha =.84$, happiness, $\alpha =.92$).

23 Regulation of Emotions Questionnaire (REQ; Phillips & Power 2007) is a 21 item
24 self-report measure which categorises emotion regulation strategies as functional or
25 dysfunctional (in relation to acceptance or rejection of emotional state). The REQ asks

Derealisation, self-harm and PTSD

1 respondents to rate how often, in general, they engage in the use of the strategies in response
2 to their emotions on a five-point Likert Scale (1= Never, 2=Seldom, 3= Often, 4=Very Often,
3 5= Always). The items draw onto four subscales; intrapersonal functional/ dysfunctional
4 regulatory strategy (e.g., cognitive change) and interpersonal functional/ dysfunctional
5 regulatory strategy (e.g., environmental change). The validity of this measure was supported
6 in a study with adolescents (Philips & Power, 2007). The mediating variables were derived
7 from the dysfunctional intrapersonal subscale. In the present study, satisfactory levels of
8 internal consistency were found for each of the sub-scales, Intrapersonal dysfunctional $\alpha=.62$,
9 Intrapersonal functional $\alpha =.68$, Interpersonal dysfunctional $\alpha =.86$ and Interpersonal
10 functional $\alpha =.81$.

11 *Data Analysis*

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

1 Serial multiple mediation models were tested using PROCESS v2 macro (Hayes
2 2013). We constructed a number of serial multiple mediator models to test whether individual
3 trauma-related emotions affect PTSD severity through two proposed mediators (i.e.
4 derealisation and self-harm). This procedure allowed for all mediators to be examined
5 concurrently and allowed us to estimate the specific indirect effect for each mediator and the
6 total indirect effect. Indirect effects were interpreted as significant when the bias-corrected
7 confidence interval does not include zero (Mallinckrodt, Abraham, Wei, & Russell, 2006;
8 Preacher & Hayes, 2008). To identify the importance of sequence between the mediators, the
9 first four models investigated the effects of individual trauma-related emotions (anger,
10 sadness, disgust and fear) on PTSD severity through a sequential path of derealisation
11 preceding self-harm. The order of sequential mediators was exchanged, i.e. self-harm
12 precedes derealisation. Age, gender and education were entered as a covariate in the serial
13 mediation models. Previous research has shown men and women show differences in the age
14 distribution of PTSD prevalence during their lifespan and there is a link between less
15 education and greater PTSD severity (Kessler, Sonnega, Bromet, Hughes, Nelson 1995;
16 Ullman & Filipas, 2001).

17 **RESULTS**

18 *Preliminary analyses*

19 Means (SD) and Pearson r correlations for all variables are presented in Table 1 and 2. One-
20 way repeated ANOVAs demonstrated a significant difference between the frequency of
21 experience of the basic state emotions [$F(4,105) = 51.01, p < .001, \eta^2 = .66$]. Post hoc tests
22 using the Bonferroni correction demonstrated that significantly higher levels of state disgust
23 ($M = 23.34, SD = 8.34; p < 0.01$) were reported compared to all other emotions. Further analysis
24 demonstrated a significant difference between the use of intrapersonal dysfunctional
25 strategies [$F(4,150) = 50.52, p < .001, \eta^2 = .66$]. Post hoc tests using the Bonferroni correction

Derealisation, self-harm and PTSD

1 demonstrated that significantly higher levels of rumination were reported compared to other
2 emotion regulation strategies ($M=4.44$ $SD=.81$; $p<0.01$). Overall, CSA survivors reported
3 significantly higher emotional experiences of disgust. The most prevalent emotion regulation
4 strategy reported was rumination.

5 Linear regression analyses were performed to assess emotion regulation strategies
6 (intrapersonal dysfunctional, intrapersonal functional, interpersonal dysfunctional, and
7 interpersonal functional) as predictors of PTSD severity. Intrapersonal dysfunctional
8 emotion regulation strategies were found to be uniquely related with PTSD severity
9 ($\beta=0.47$, $p<.001$). A further linear regression was performed to assess dysfunctional
10 intrapersonal strategies on the likelihood of predicting PTSD severity. Self-harm ($\beta=.30$
11 $p<.005$), repression ($\beta=.20$, $p<.05$) and derealisation strategies ($\beta=.21$, $p<.05$) were found
12 to be uniquely related with PTSD severity (see Table 2).

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

21 [Insert Table 2]

22 [Insert Table 3]

23

24

1 *Multiple mediation analyses*

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

8 [Insert Figure 5]

9 [Insert Figure 6]

10

11 *Sadness*

12 In the first serial mediation analysis (see Figure 1), a significant total and direct effect
13 for trauma related sadness on PTSD severity was observed, via derealisation and self-harm
14 ($c_2 = 1.433$, CI = .968 to 1.897, $p < .001$; $c'_2 = .946$, CI = .457 to 1.435, $p < .001$). The
15 mediational analysis indicated that the total indirect effect and three specific indirect effects
16 were significant (see Table 5). The total indirect effect of disgust on PTSD severity was
17 statistically significant (point estimate = .464, SE = .160, CI = .185 to .821). The indirect path of
18 sadness through derealisation alone (point estimate = .239, SE = .137, CI = .001 to .536) was
19 statistically significant. The indirect effect of sadness on PTSD severity via derealisation and
20 self-harm was also significant (point estimate = .081, SE = .047, CI = .020 to .222). This model
21 indicates greater experience of sadness is sequentially associated with increased levels of
22 derealisation and increased levels self-harm which in turn is linked to greater PTSD severity.
23 The indirect pathway for disgust through self-harm alone was statistically significant (point
24 estimate = .144, SE = .080, CI = .026 to .351).

Derealisation, self-harm and PTSD

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

9 [Insert Figure 1]

10 [Insert Figure 2]

11 *Disgust*

12 In the third serial mediation analysis (see Figure 3), a significant total and direct effect for
13 trauma related disgust on PTSD severity was observed, via derealisation and self-harm ($c_3 =$
14 $.749$, CI =.465 to 1.033, $p = <.001$; $c'_3 = .392$, CI =.074 to .710, $p = <.005$). This mediational
15 analysis also produced a significant total indirect effect and three specific indirect effects.
16 The total indirect effect of disgust on PTSD severity was statistically significant (point
17 estimate=.358, SE= .122, CI=.145 to .624). The indirect effects for all paths of the disgust –
18 PTSD relationship were statistically significant. The indirect path of sadness through
19 derealisation alone (point estimate= .183, SE=.090 CI=.040 to .388) was statistically
20 significant. The indirect effect of disgust on PTSD severity via derealisation and self-harm
21 was also significant (point estimate=.036, SE=.024, CI=.006 to .110). This model indicates
22 greater experience of disgust is sequentially associated with increased levels of derealisation
23 and increased levels self-harm which in turn is linked to greater PTSD severity. The indirect
24 pathway for disgust through self-harm alone was statistically significant (point estimate
25 =.139, SE=.069, CI=.028 to .309).

1 PTSD severity. Gender was a significant covariate ($p < .050$) in both models. It is interesting to
2 note that the indirect path for fear through self-harm was statistically significant (point
3 estimate = .215, SE = .097, CI = .065 to .460) with this sequential of mediators therefore the
4 proposed mediators in these two models of fear to PTSD severity (Fig. 5 & 6) do hold great
5 importance.

6 *Anger*

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

10 [Insert Table 4]

11 [Insert Table 5]

12 **DISCUSSION**

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

23 We found support for our two hypotheses. Firstly, the bivariate correlations results
24 revealed all negative emotions were significantly correlated with PTSD. This finding is

1 consistent with earlier findings showing a close association between negative emotions and
2 PTSD among CSA survivors (Badour, Resnick & Kilpatrick 2015; Coyle et al., 2014; Görg et
3 al., 2017). It was found that sadness most strongly correlated with PTSD severity. All
4 negative emotions displayed significant associations to each of the mediators. These findings
5 are consistent with the suggestion that trauma-related emotions might lead to self-harm
6 (Smith, Kouros, and Meuret; 2014) and dissociation (Briere, Scott, & Weathers, 2005). The
7 results from the mediating variables to PTSD severity also displayed significant associations.
8 These findings are consistent with previous research in the area (Smith et al., 2014; Franzke,
9 Wabnitz, & Catani, 2015; Kratzer et al., 2017; Marx & Sloan, 2005).

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

Derealisation, self-harm and PTSD

1 the expression of anger as a result of fear of interpersonal rejection (Luterek, Harb,
2 Heimberg, Marx; 2004).

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

20 This study has several limitations including its cross-sectional nature prohibiting the
21 conclusion of causal relationships. Future work should focus on the exploration of the causal
22 relationships between trauma-related emotions, emotion regulation difficulties and PTSD
23 using longitudinal or prospective designs. The predominately-female sample, who are CSA
24 survivors, also limits the generalizability of findings to the wider trauma population.
25 Furthermore, all measures were self – reported rather clinician-administered interviews.

1 Finally, it is important to mention that the mediating variables were based on single item
2 questions. Notwithstanding its limitations, this is the first study to explore the use of specific
3 strategies to regulate specific emotions following exposure to traumatic events. Our results
4 suggest targeting derealisation and self-harm sequentially during therapy may be useful to
5 reduce PTSD severity among CSA survivors.

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1 **Table 1**

2 Demographic and population characteristics, and means, standard deviations of PTSD and
 3 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)

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Derealisation, self-harm and PTSD

1 **Table 2.**
 2 Unstandardized (standard error) and standardized beta values for the predictors of symptoms
 3 of PTSD severity
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Predicting PTSD severity	Unstandardized coefficients		Standardized coefficients		p	[95.0% C.I]
	β	SE	β	t		
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]

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

Derealisation, self-harm and PTSD

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)

Variables	Descriptives		Correlations						
	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 Questionnaire Intrapersonal 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	a ₁	.062 (.025)	.013	[.014 .111]	Anger to SH	a ₉	.092 (.028)	.001	[.037 .146]
Anger to SH	a ₂	.066 (.027)	.015	[.013 .119]	Anger to DR	a ₁₀	.033 (.024)	.183	[-.016 .081]
Effect of M1 and M2	d ₁	.410 (.109)	.000	[.195 .626]	Effect of M1 and M2	d ₅	.324 (.086)	.000	[.154 .495]
DR to PTSD	b ₁	3.597 (1.082)	.001	[1.448 5.746]	SH to PTSD	b ₉	2.716 (.958)	.006	[.812 4.620]
SH to PTSD	b ₂	2.716 (.958)	.006	[.812 4.620]	DR to PTSD	b ₁₀	3.597 (1.082)	.001	[1.448 5.746]
Total effect	c ₁	.965 (.290)	.001	[.389 1.542]	Total effect	c ₅	.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	a ₃	.095 (.021)	.000	[.053 .138]	Sadness to SH	a ₁₁	.097 (.025)	.000	[.047 .147]
Sadness to SH	a ₄	.062 (.027)	.022	[.009 .115]	Sadness to DR	a ₁₂	.070 (.022)	.002	[.026 .114]
Effect of M1 and M2	d ₂	.365 (.116)	.002	[.135 .596]	Effect of M1 and M2	d ₆	.264 (.084)	.002	[.098 .430]
DR to PTSD	b ₃	2.504 (1.070)	.022	[.377 4.630]	SH to PTSD	b ₁₁	2.321 (.902)	.012	[.529 4.114]
SH to PTSD	b ₄	2.321 (.902)	.012	[.529 4.114]	DR to PTSD	b ₁₂	2.504 (1.070)	.022	[.377 4.630]
Total effect	c ₂	1.433 (.234)	.000	[.968 1.897]	Total effect	c ₆	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]

Derealisation, self-harm and PTSD

Disgust to DR	a ₅	.059 (.013)	.000	[.034 .085]	Disgust to SH	a ₁₃	.080 (.014)	.000	[.053 .108]
Disgust to SH	a ₆	.064 (.015)	.000	[.034 .094]	Disgust to DR	a ₁₄	.041 (.014)	.005	[.012 .070]
Effect of M1 and M2	d ₃	.276 (.110)	.014	[.058 .495]	Effect of M1 and M2	d ₇	.229 (.091)	.014	[.048 .411]
DR to PTSD	b ₅	3.076 (1.102)	.006	[.886 5.267]	SH to PTSD	b ₁₃	2.172 (.999)	.032	[.188 4.157]
SH to PTSD	b ₆	2.172 (.999)	.032	[.188 4.157]	DR to PTSD	b ₁₄	3.076 (1.102)	.006	[.886 5.267]
Total effect	c ₃	.749 (.143)	.000	[.465 1.033]	Total effect	c ₇	.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	a ₇	.094 (.024)	.000	[.046 .141]	Fear to SH	a ₁₅	.085 (.028)	.004	[.028 .141]
Fear to SH	a ₈	.046 (.029)	.113	[-.011 .104]	Fear to DR	a ₁₆	.069 (.024)	.004	[.022 .116]
Effect of M1 and M2	d ₄	.409 (.115)	.001	[.180 .639]	Effect of M1 and M2	d ₈	.291 (.082)	.001	[.128 .454]
DR to PTSD	b ₇	2.705 (1.061)	.013	[.596 4.814]	SH to PTSD	b ₁₅	2.546 (.894)	.005	[.769 4.323]
SH to PTSD	b ₈	2.546 (.894)	.005	[.769 4.323]	DR to PTSD	b ₁₆	2.705 (1.061)	.013	[.596 4.814]
Total effect	c ₄	1.416 (.254)	.000	[.911 1.920]	Total effect	c ₈	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 R ² = .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 R ² = .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 R ² = .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 R ² = .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 R ² = .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 R ² = .292				

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

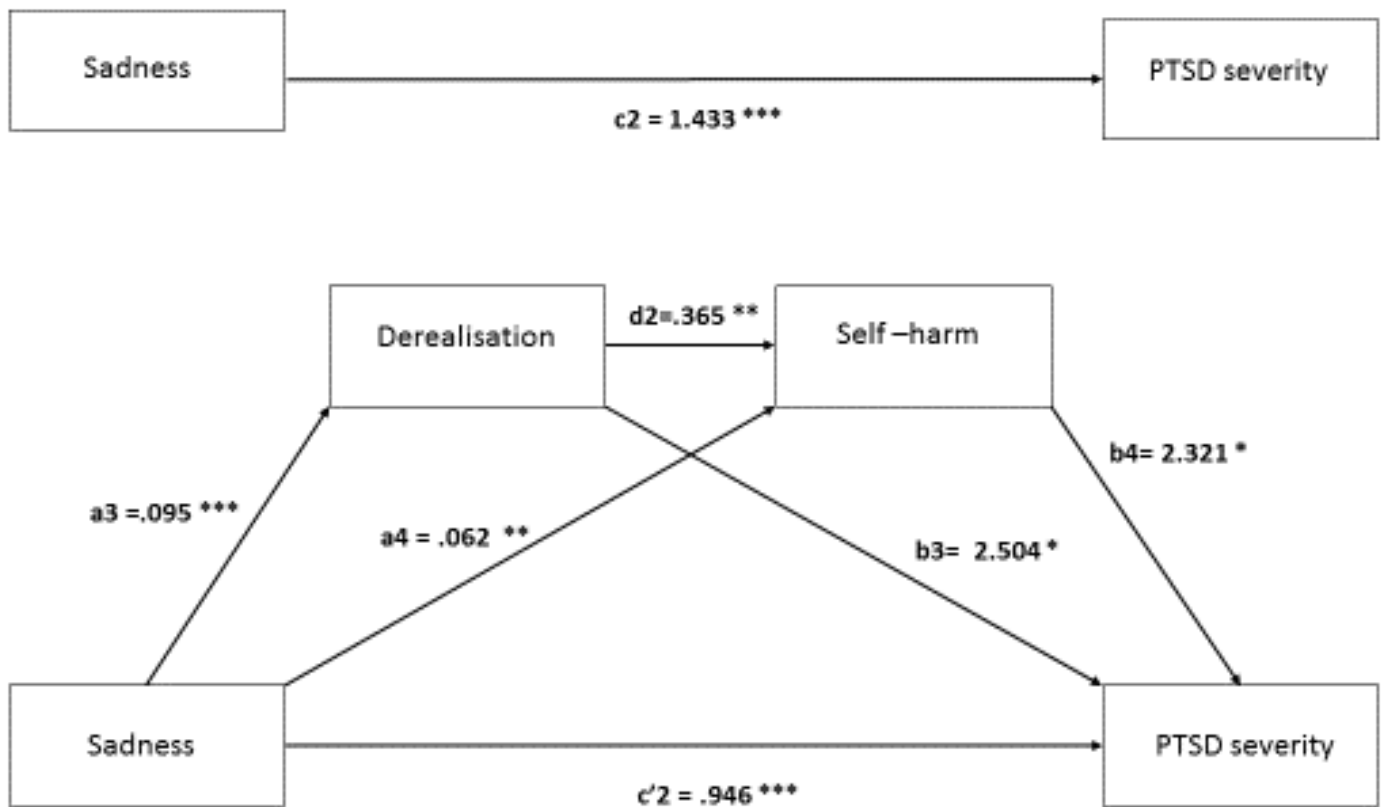


Fig.1. Derealisation and self-harm ER strategies sequentially mediating the relationship between trauma-related sadness and PTSD severity. Unstandardized coefficients are displayed. Model covariate include education. * $p < .05$, ** $p < .01$, *** $p < .001$

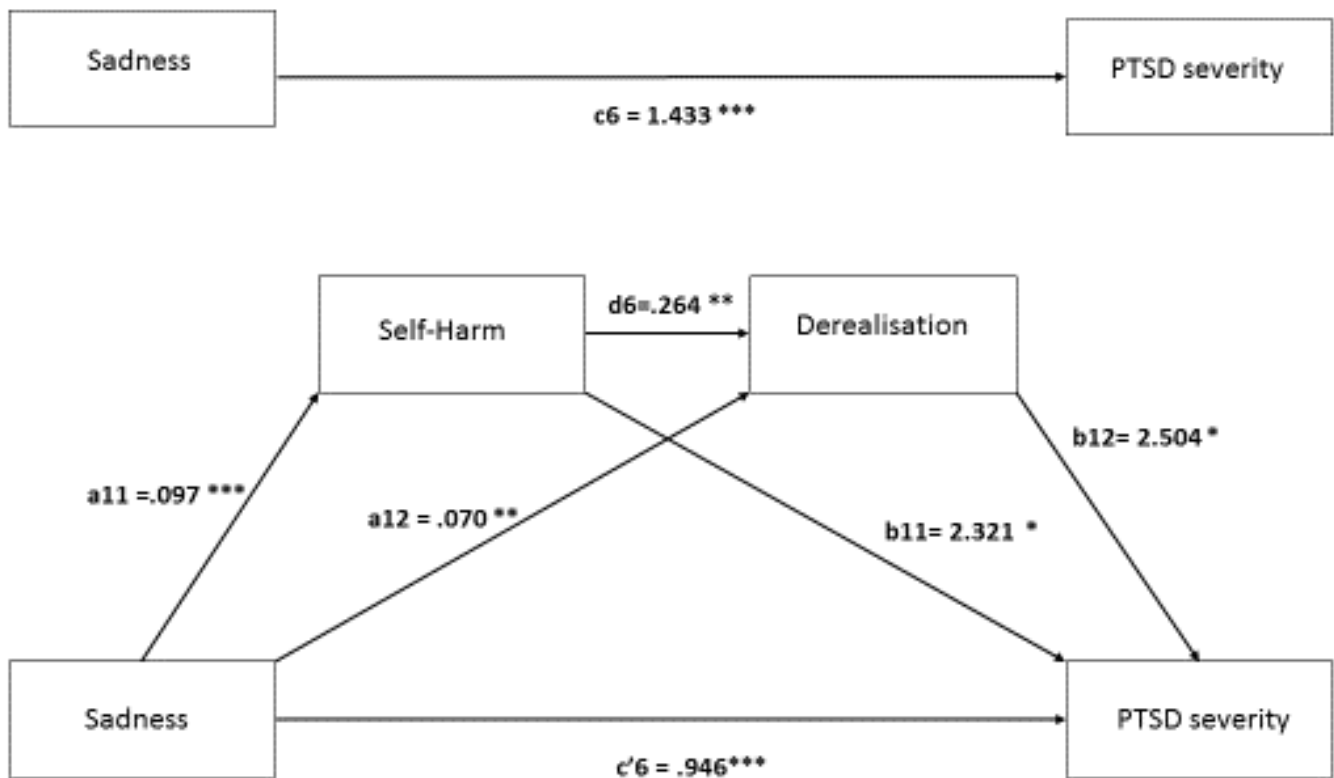


Fig. 2. Self harm and derealisation ER strategies sequentially mediating the relationship between trauma-related sadness and PTSD severity. Unstandardized coefficients are displayed. Model covariate include education. * $p < .05$, ** $p < .01$, *** $p < .001$

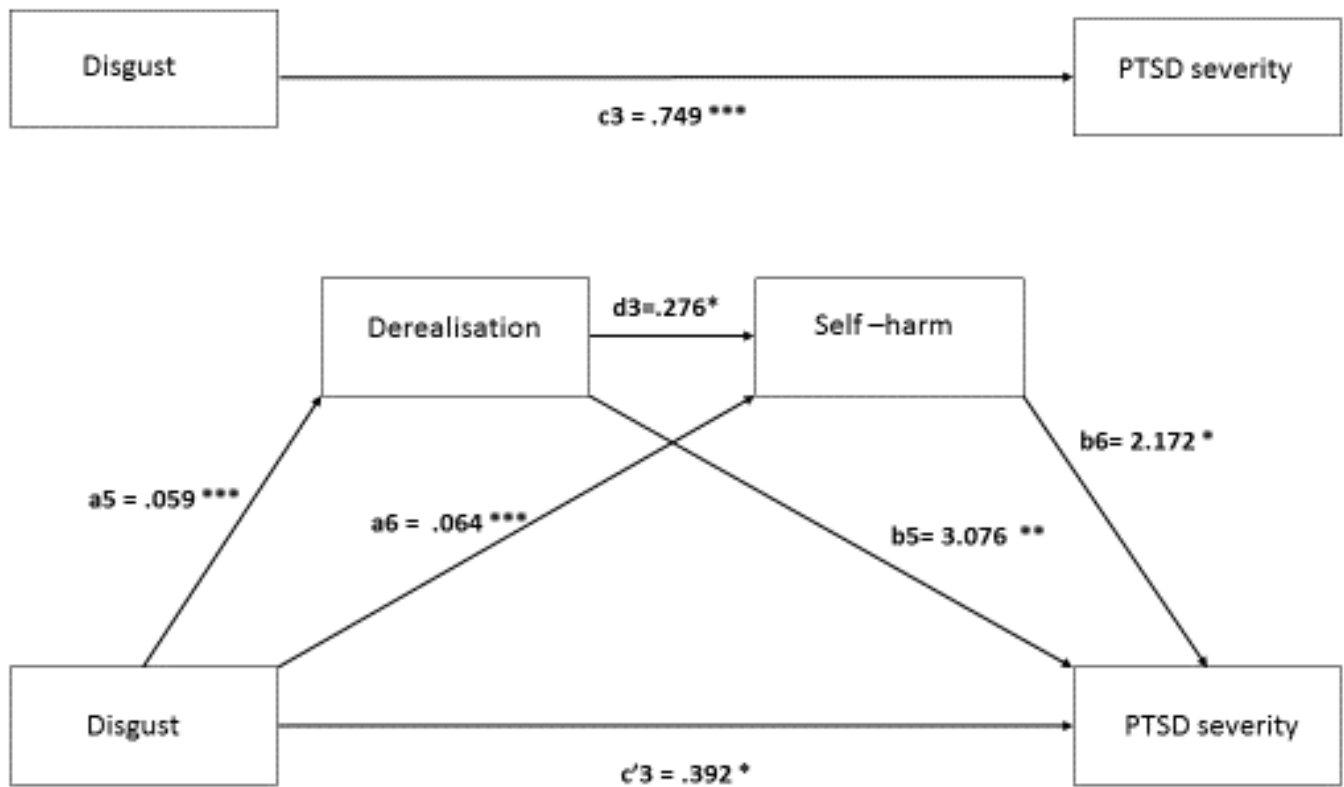


Fig. 3. Derealisation and self-harm ER strategies sequentially mediating the relationship between trauma-related disgust and PTSD severity. Unstandardized coefficients are displayed. Model covariate include education. * $p < .05$, ** $p < .01$, *** $p < .001$

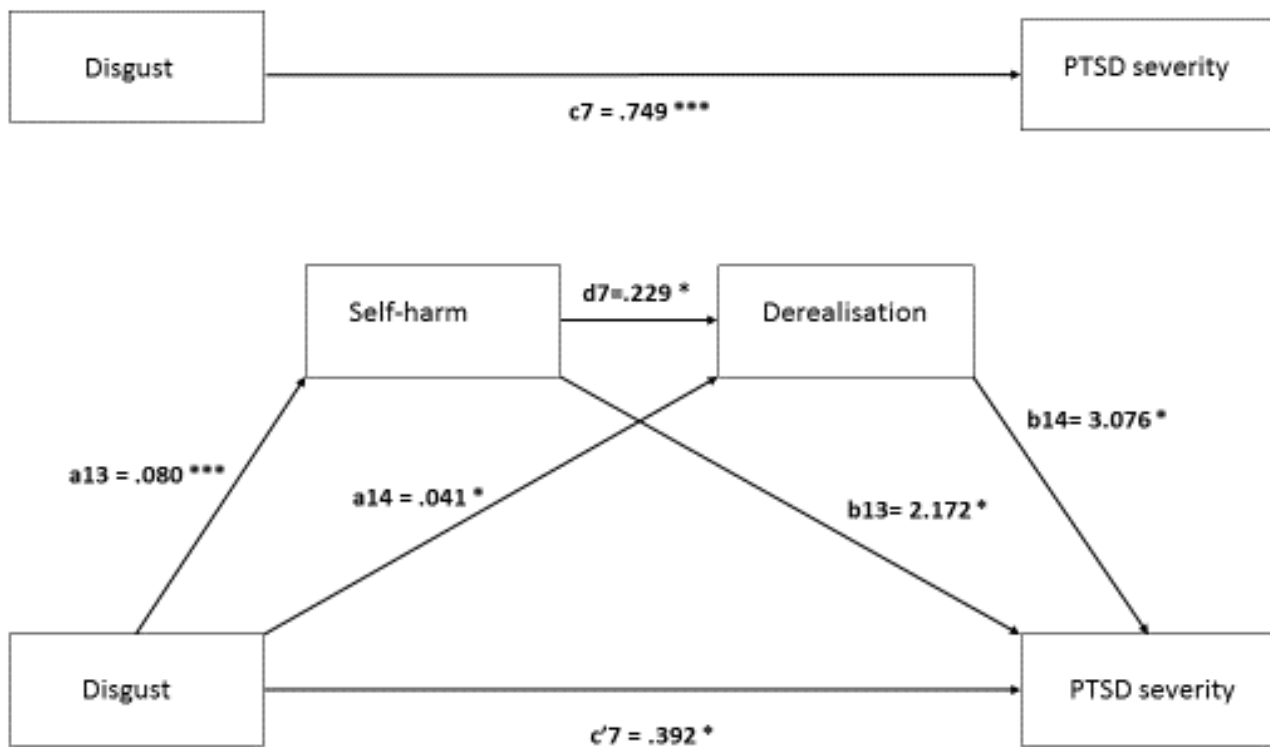


Fig. 4. Self harm and derealisation ER strategies sequentially mediating the relationship between trauma-related disgust and PTSD severity. Unstandardized coefficients are displayed. Model covariate include education. * $p < .05$, ** $p < .01$, *** $p < .001$

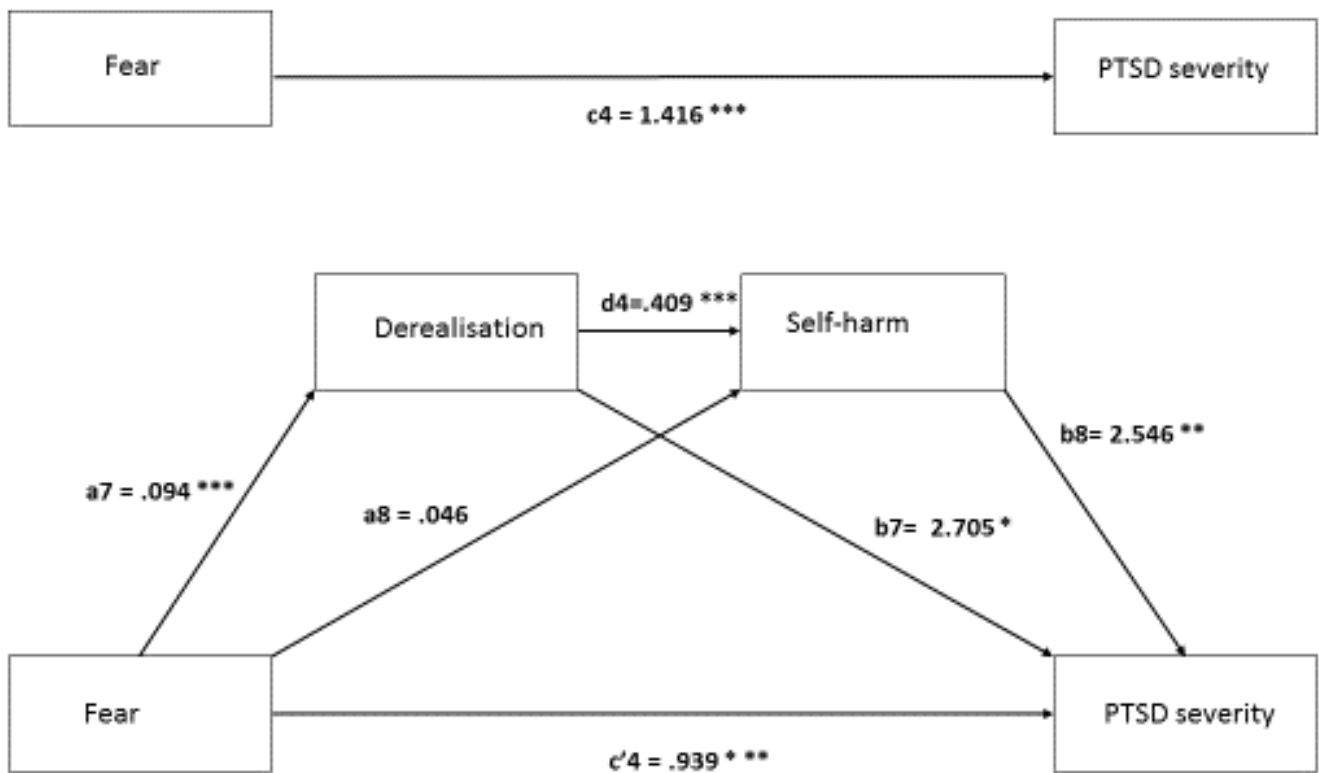


Fig. 5. Derealisation and self-harm ER strategies sequentially mediating the relationship between trauma-related fear and PTSD severity. Unstandardized coefficients are displayed. Model covariate include education. * $p < .05$, ** $p < .01$, *** $p < .001$

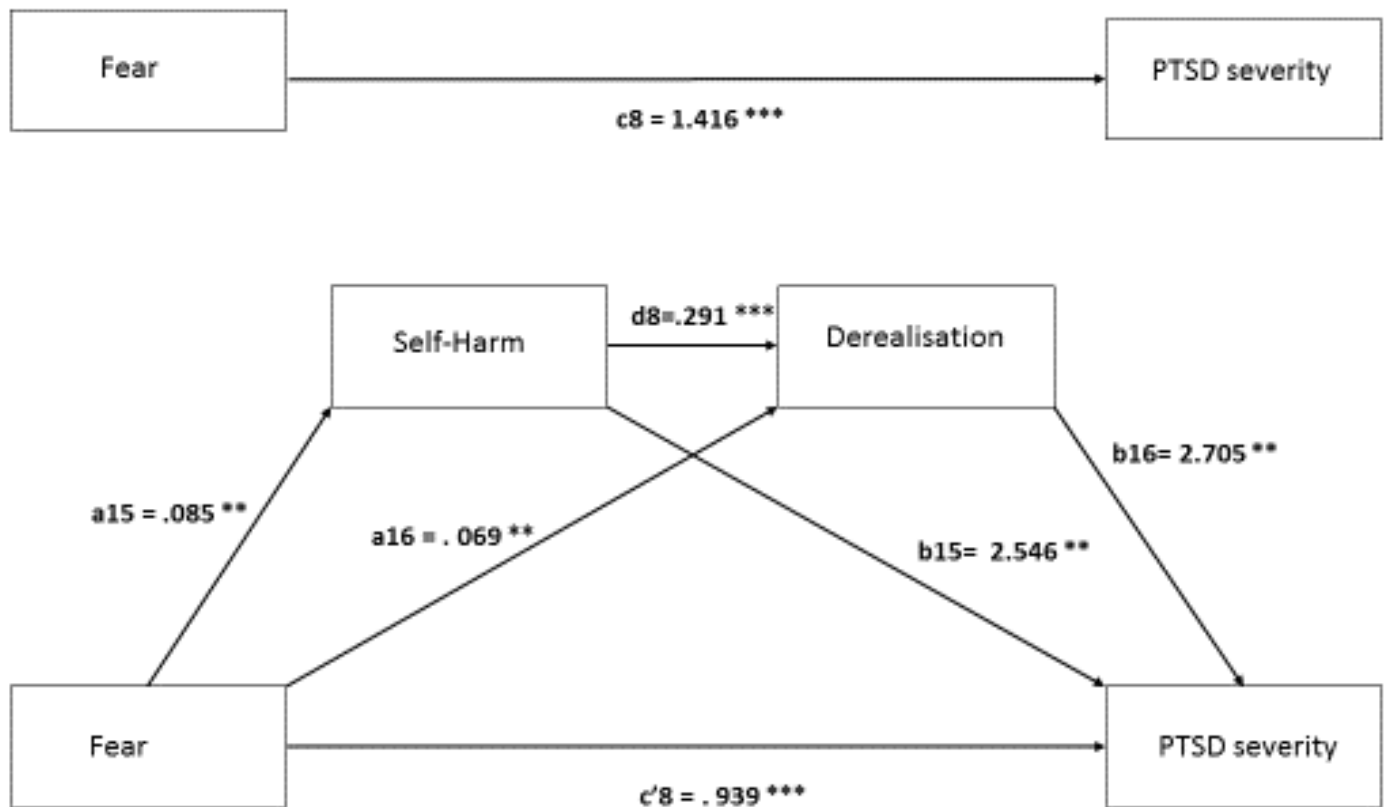


Fig. 6. Self harm and derealisation ER strategies sequentially mediating the relationship between trauma-related fear and PTSD severity. Unstandardized coefficients are displayed. Model covariate include education. * $p < .05$, ** $p < .01$, *** $p < .001$