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Trait and state dissociation in the prediction of intrusive images

Muriel A. Hagedaars^a & Julie Kras^b

^aDepartment of Clinical Health and Neuropsychology, Leiden University

^bDepartment of Clinical Psychology, Behavioural Science Institute, Radboud University
Nijmegen

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The definitive version was published as
Hagedaars, M., & Kras, J. (2011). Trait and state dissociation in the prediction of intrusive images. *International Journal of Cognitive Therapy*, 4(2), 145-153.

Correspondence should be addressed to: M.A. Hagedaars, Department of Clinical Health and neuropsychology, Leiden University, PO Box 9555, 2300 RB Leiden, the Netherlands. Tel.: +31-71-3613748. Fax: +31-71-3615594. Email: mhagedaars@fsw.leidenuniv.nl.

Acknowledgements

M. Hagnaars was supported by VENI Grant (#016.105.142) from the Netherlands Organization for Scientific Research (NWO). We are grateful to Anke Ehlers for providing the trauma film.

Abstract

The present study investigated the predictive power of trait dissociation on the development of intrusive images and the mediating role of peri-traumatic state dissociation and horror in this relationship. An observational quasi-experimental design was used with an aversive film to model a traumatic experience. Participants ($N = 99$) were exposed to a 10-minute trauma film after completing the Dissociative Experiences Scale C (DES C). After the film participants completed the DSS (Dissociative States Scale) and indicated their subjective horror. Intrusive images of the film were recorded in the subsequent week using an intrusion diary. Results showed that trait dissociation predicted intrusion frequency. This effect disappeared after controlling for peri-traumatic horror, suggesting that state horror could have mediated the trait dissociation – intrusion relationship. State dissociation was associated with intrusion frequency in univariate, partial correlations but not in the final model including horror. The results underscore the importance of peri-trauma emotions in the prediction of PTSD and as a possible explaining factor of the predictive power of dissociation.

Trait and state dissociation in the development of intrusive images

Posttraumatic stress disorder (PTSD) is a disabling condition that is somewhat distinct from other psychiatric disorders in that the cause - a traumatic event - is a requirement in the DSM-IV criteria (American Psychiatric Association, 2000). However, most people do not develop PTSD after trauma-exposure, which has led to numerous studies investigating possible risk factors. Dissociation (both trait dissociation and peritraumatic dissociation) frequently has been linked to PTSD development (McCaslin et al., 2008; Ozer, Best, Lipsey, & Weiss, 2003). However, the differential or even cumulative effect of trait and state dissociation has scarcely been examined. The present study therefore aimed to investigate the effect of trait and state dissociation on the development of intrusive images in a quasi-experimental design. We especially aimed to test a model in which state variables mediated the association between trait dissociation and intrusion development.

Trait dissociation refers to a general tendency to experience dissociative symptoms and is considered a relatively stable trait. Several empirical studies found trait dissociation to be a risk factor for PTSD development after trauma (McCaslin et al., 2008; Murray, Ehlers & Mayou, 2002). Trait dissociation was indeed positively related to PTSD development in several studies (Briere, Scott, & Weathers, 2005; Gershuny & Thayer, 1999). Furthermore, although PTSD patients with high trait dissociation improved as much as low trait dissociation patients after exposure therapy, their general PTSD symptom levels were overall higher (Hagenaars, Van Minnen, & Hoogduin, 2010). High trait dissociation patients may thus have higher stress levels in general and trait dissociation may reflect a relatively stable trait that represents a chronically vulnerability to stress.

State dissociation refers to a temporary dissociative state. Peritraumatic dissociation (state dissociation during and right after the trauma) has often been studied in the last decades and has proven to be one of the strongest predictors of PTSD in a meta-analysis (Ozer et al.,

2003). However, many studies on peritraumatic dissociation are retrospective and uncontrolled, and thus subject to problems such as forgetting, attribution of symptoms, and over-reporting (Candel & Merckelbach, 2004). Moreover, peritraumatic dissociation had no predictive power in studies controlling for initial PTSD symptoms (Hagenaars, Van Minnen, & Hoogduin, 2007; Marshall & Schell, 2002) or persistent dissociation (Briere, Scott Weathers, 2004; Murray, Ehlers, & Mayou, 2002). The fact that the predictive power of peritraumatic dissociation sometimes disappears after controlling for other, stress-related factors may mean that state dissociation is an indicator of severe state emotions. Indeed, associations were found between emotional numbing (considered a dissociative detachment state) and PTSD hyperarousal symptoms (Flack, Litz, Hsieh, Kaloupek & Keane, 2000), and between peritraumatic dissociation and peritraumatic distress (Fikretoglu et al., 2006). Very few persons in the latter study reported high levels of dissociation in combination with low levels of distress, suggesting that dissociation may be an epiphenomenon or symptom of distress. In addition, there is some research suggesting that dissociative symptoms are a response to fear or horror (e.g., Fikretoglu et al., 2007) or coping strategies in response to extreme arousal (Felmingham et al., 2008). Dissociation may also be a result of neuroendocrine changes during stress (Giesbrecht, Smeets, Merckelbach, & Jellicic, 2007; Videlock, et al., 2008). Furthermore, subjective trauma severity (e.g., horror) has been shown to be a rather persistent predictor of PTSD (Brewin, Andrews, & Valentine, 2000). More specifically, the emotion of intense fear or horror is included in the DSM-IV A2 criterion of PTSD. Horror was the most common reaction to a trauma film in an experimental analogue study (Hagenaars, Van Minnen, Holmes, Brewin, & Hoogduin, 2008). For these reasons, the present study included a measure of peri-trauma horror in addition to trait and state dissociation measures.

Dissociative symptoms are often considered to be coping mechanisms, in which case they should be observed mostly in persons with the ability to have these experiences. Thus, especially those with high dissociative tendencies (i.e., high trait dissociation) should display state dissociative symptoms in reaction to trauma. Direct associations between trait and spontaneous state dissociation have indeed been reported (McCaslin et al., 2008; Zoellner, Sacks, & Foa, 2007). In addition, higher trait dissociation was related to more pronounced dissociative symptoms after a laboratory dissociation induction (Leonard, Telch, & Harrington, 1999). However, the role of peritraumatic dissociation as a mediator in the trait dissociation – PTSD relation remains to be clarified.

In sum, both trait and state dissociation have been associated with PTSD development. The trait dissociation – PTSD relation may be mediated by state dissociation, as state variables seem to be the strongest PTSD predictors (Brewin et al., 2000), and more trait dissociation is associated with increased state dissociation (Zoellner et al., 2007). The present study aims to investigate the effects of trait and state dissociation on the development of intrusive memories in an observational quasi-experimental design. We included peri-trauma horror to test the possibility that dissociation is a mediator because of its relation with peri-trauma emotions. Both state variables (state dissociation and horror) were expected to mediate the association between trait dissociation and intrusion frequency.

Method

Participants

Participants were recruited at Radboud University Nijmegen and College Arnhem-Nijmegen. Ninety-nine participants (13 males) were included after screening for exclusion criteria (psychotic disorders, depression, PTSD, panic disorder, blood phobia, and having been in a serious traffic accident). Age ranged from 18 to 57, with a mean age of 22.5 years

($SD = 4.5$). The study was approved by the ethical committee for human-related research (CMO approval number 2005/063).

Material

A 10-minute film depicting four traumatic scenes of real-life footage of the horrible aftermath of road traffic accidents was used to model a traumatic experience. A brief commentary introduced each scene and provided background information about the accident and the people involved. This particular four-scene film has been used before and proved effective in evoking horror (Hagenaars, Van Minnen, Holmes, Brewin, & Hoogduin, 2008; Krans, Näring, Holmes, & Becker, 2010). The film was projected on a 113 cm x 88 cm screen.

Measures

Trait dissociation. The tendency to have dissociative experiences was assessed using the Dissociative Experiences Scale C (DES C; Wright & Loftus, 1999). The DES C is a 28-item self rating scale on which the participant has to indicate how much of the time (from 0 to 100) specific dissociative symptoms occur in comparison to others. The DES C has excellent reliability (Cronbach's $\alpha = .93$; Wright & Loftus, 1999) and is better at differentiating low trait dissociators (likely to be found in a healthy student sample like ours) compared to the commonly used DES (Bernstein & Putnam, 1986).

State horror. Immediately after film viewing, participants rated to what extent they felt horrified "at this moment" on an 11-point scale ranging from 0 ("not at all") to 10 ("extremely").

State dissociation. The Dissociative State Subscale (DSS; Bremner et al., 1998) was used to assess state dissociation. The 19 DSS items originate from the Clinician Administered Dissociative States Scale (Bremner et al., 1998) and address amnesia, depersonalisation and

derealisation on a 5-point Likert scale. The 19 DSS items have good reliability (Cronbach's $\alpha = .94$; Bremner et al., 1998).

Intrusive memories. Participants recorded intrusive memories of the film for seven days using an Intrusion Diary, the standard method to measure intrusions in film-paradigm research (e.g., Holmes, Brewin & Hennessy, 2004). For each intrusive memory, participants wrote down a brief description of its content and whether it was an image or thought. Only intrusive images were included in the present study. Diary compliance was checked at follow up (Davies & Clark, 1998); participants rated how true the following sentence was from 0 ("not at all true") to 10 ("extremely true"): I have often been unable (or have forgotten) to record my intrusive images in the diary.

Attention. Participants rated how much attention they had paid to the film on a visual analogue scale from 0 ("none at all") to 10 ("extremely").

Procedure

Participants were tested individually. They provided written informed consent after being informed about the experiment, completed the DES C, and watched the film. Participants were told to fully attend to the film and not look away or close their eyes. The experimenter left the room and came back after the film had finished. Post-film questionnaires (attention, DSS and horror) were then completed and the Intrusion Diary was explained. Participants handed in this Diary seven days later at follow up, filled out the diary compliance rating, and received course credits for their involvement.

Statistical analyses

The mediation analyses were done following the steps described by Baron and Kenny (1986): 1) the independent variable is related to the outcome, 2) the independent variable is related with the mediator, 3) the mediator affects the outcome variable (while controlling for the initial variable), and 4) the effect of the independent variable should be reduced after

controlling for the mediator. This leads to the following hypotheses in the present study: 1) DES C is related to intrusion frequency, 2) DES C is related to post-film DSS and horror, 3) post-film DSS and horror are associated with intrusion frequency (while controlling for DES C), and 4) the predictive value of DES C on intrusion frequency will be reduced (partial mediation) or become zero (full mediation) after controlling for DSS and horror. We controlled for attention in all analyses that included intrusion frequency, as attention for the film might have affected the subsequent number of intrusive images about the film.

Results

The data were checked for outliers on all measures. One case was an outlier on the DSS, scoring more than three times the interquartile range above the upper quartile, and was therefore removed from the analyses. Attention paid to the film and diary compliance were checked; participants ratings indicated that they paid good attention to the film ($M = 7.33$, $SD = 1.64$) and believed they recorded intrusions accurately ($M = 1.30$, $SD = 1.68$). Male and female students did not differ in the frequency of intrusive images ($M = 2.31$ and $M = 2.60$ respectively; $t(97) = .27$, $p = .79$). Means (SD s) of all variables are listed in Table 1.

(Table 1 around here)

Partial correlation controlling for Attention showed that the DES C was related to intrusion frequency ($r = .23$, $p = .025$), confirming step 1. Correlations between DES C and DSS ($r = .24$, $p = .018$) and between DES C and horror ($r = .21$, $p = .04$) were also significant, confirming step 2. Partial correlations between DSS and intrusion frequency and horror and intrusion frequency, controlling for DES C and Attention, showed that both DSS and horror were related to intrusion frequency ($r = .21$, $p = .038$ and $r = .37$, $p < .001$, respectively), confirming step 3.

The final model (step 4) was tested using hierarchical regression analyses on intrusion frequency with Attention in the first block, DES C in the second block and DSS and horror in the third block. Attention did not predict intrusion frequency ($\beta = .13, p = .21; \Delta R^2 = .02, p = .21$). Although DES C initially predicted intrusion frequency ($\beta = .23, p = .02$), its predictive power diminished and no longer reached significance after entering the DSS and horror ($\beta = .14, p = .14$) in the model. The total model was significant ($\Delta R^2 = .14, p = .001$), with post-film horror now predicting intrusion frequency ($\beta = .33, p = .001$). Thus, horror mediated the association between DES C and intrusion frequency. Interestingly, DSS no longer predicted intrusion frequency in this final model ($\beta = .12, p = .22$) and therefore could not have mediated the DES C – intrusion frequency association. Figure 1 presents a schematic representation of the final mediation model.

An additional test of whether DSS and horror would carry the influence of DES C on intrusive images was done with a Sobel-test (Sobel, 1982), using the regression coefficients and standard errors of the DES C-DSS-intrusive images (DES C-DSS and DSS-intrusive images) and DES C-horror-intrusive images paths (DES C-horror and horror-intrusive images). The indirect effect of DES C on intrusive images was significant via horror ($p = .01$), but not via DSS ($p = .19$).

(Figure 1 around here)

The fact that the association between DSS and intrusive images disappeared in the final model, in which horror was taken into account, raised the question whether peritraumatic state dissociation is merely a symptom reflecting distress in those who are prone to experience dissociation. Therefore, we performed a median-split ($Mdn = 30.36$) resulting in 49 high DES C and 48 low DES C participants (see Table 2). Indeed, DSS was

related to peri-trauma horror in the high DES C participants ($r = .29, p < .05$), whereas no such correlation was found for the low DES C participants ($r = .12, p = .44$).

(Table 2 around here)

Discussion

The present study investigated the mediating effect of peri-trauma state variables (dissociation and horror) on the relation between trait dissociation and intrusion frequency. We found that trait dissociation predicted the frequency of intrusive images, but this effect was no longer significant after controlling for peri-trauma horror. Trait dissociation was also related to state dissociation but the latter did not predict intrusion frequency after controlling for horror either.

Interestingly, a high tendency to dissociate was not a strong predictor of intrusion frequency after controlling for state variables. That is, peri-trauma horror strongly predicted intrusion frequency. This has some theoretical and clinical implications. Theoretically, our results indicate that higher levels of trait dissociation are associated with higher chances to respond with dissociation, but also with horror. This may mean that trait dissociation reflects a broader personality trait that indicates a general vulnerability to stress, rather than just the tendency to experience state dissociation. Possibly, individuals with high trait dissociation more easily experience negative emotions in general or even use negative appraisals more often. Indeed, in earlier studies trait dissociation was associated with personality traits such as neuroticism (Goldberg, 1999; Kwapil, Wrobel, & Pope, 2002), temperament (Grabe, Spitzer, & Freyberger, 1999), and psychiatric symptoms in general (Spindler & Elklit, 2003). It was also negatively related to the amount of time that participants were able to hold their arm in ice water (Giesbrecht, Smeets & Merckelbach, 2008), again suggesting lower resistance to

general stress or pain. Interestingly, individuals experienced dissociation not only during negative but also during positive emotions (Candel & Merckelbach, 2004), suggesting that dissociation may even be an epiphenomenon of arousal rather than valence.

As expected, trait dissociation was associated with more peri-trauma state dissociation, but this path did not go further. That is, although peri-trauma dissociation was associated with intrusion frequency in univariate correlations, this relationship was no longer significant in the total model, whereas peri-trauma horror still was related to intrusion frequency in this final model. This may indicate that peritraumatic dissociation is a symptom reflecting severe distress (only) in those who are able to “use” dissociation (i.e., those with high trait-dissociation). Indeed, subsequent analyses of our data indicated that peritraumatic dissociation was related to peri-trauma horror in the high trait dissociative participants, whereas no such correlation was found for the low trait dissociative participants. Horror may thus be an underlying PTSD predictor that can be experienced by those with and without dissociation tendencies, whereas state dissociation may predict PTSD only by means of state horror. Similarly, Harvey and Bryant (1998) found that dissociative symptoms did not improve the predictive accuracy of acute stress disorder for subsequent PTSD, again suggesting that dissociation is a symptom of distress rather than an independent predictor. As mentioned in the introduction, dissociation could also be the result of neuroendocrine changes associated with stress responses, such as decreased levels of norepinephrine and enhanced activation of the ventral prefrontal cortex (Felmingham et al., 2008; Videlock et al., 2008). The fact that spontaneous dissociation (i.e., dissociation that was not the result of an experimental manipulation) and not a dissociation manipulation has been shown to predict intrusion frequency (Holmes, Brewin, & Hennessy, 2004; Holmes, Oakley, Stuart, & Brewin, 2006) could be another indication that it is not dissociation itself but rather dissociation as a symptom of severe distress that is associated with PTSD.

Clinically, our data suggest caution with attribution of direct negative consequences to trait dissociation. Our data suggest that high trait dissociation (measured by the DES C) is not per se a negative factor if not followed by negative state emotions. This is in line with the study of Hageraars et al. (2010), who found that the improvement of high trait dissociation PTSD patients was similar to their low trait dissociation counterparts, suggesting an overall vulnerability to stress, and not an inability to change.

The present study has some limitations. First, the sample mainly included females, so the findings should be replicated in samples that are more balanced with respect to gender. Also, we used an observational, quasi experimental design. This has the advantage of being able to observe spontaneous reactions in a large sample. However, future research might manipulate state variables and investigate how this affects intrusion frequency. Adequate induction methods should be developed though, as some have been applied with success (e.g., catalepsy; Hageraars et al., 2008), whereas others were not effective (e.g., dot staring, Holmes et al., 2004). Theoretically, our results indicate that trait dissociation affects intrusion development because high levels lead to more peri-traumatic horror. However, there may be other aspects of trait dissociation that operate independently on peri-trauma emotions, for example rumination or prior traumatising. Note that in the present study the relations between the variables are moderate, which could indicate that variables that were not included explain a substantial proportion of the variance. Another reason for the moderate relations could be that, the film provoked moderate levels of state horror and state dissociation may occur especially at higher levels of state emotion. Clearly, more research is needed in this area.

In sum, we used a relatively large sample and created controlled circumstances by using a quasi-experimental design. This approach has not been used in the study of trait and state dissociation to date. The results showed that although trait and state dissociation were

initially associated with intrusion frequency, these relations disappeared after controlling for peri-trauma horror. This stresses the importance of state emotions in the development of PTSD. Also, our results suggest that state dissociation may be a symptom of distress rather than an independent predictor of PTSD, and that trait dissociation may indicate a general vulnerability to stress. From a clinical perspective, high trait dissociation should be considered in relation to peri-traumatic emotional responses. Future research on dissociation should include state emotions, as they may be of major importance being the underlying factor of the working mechanisms of dissociation.

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Table 1.

Descriptive statistics (means and standard deviations; N = 98).

Questionnaire	M	SD
DES	29.46	11.97
DSS	2.76	3.34
State horror	3.95	2.27
Intrusive Images	2.57	3.68

Note. DES = Dissociative Experiences Scale; DSS = Dissociative State Subscale.

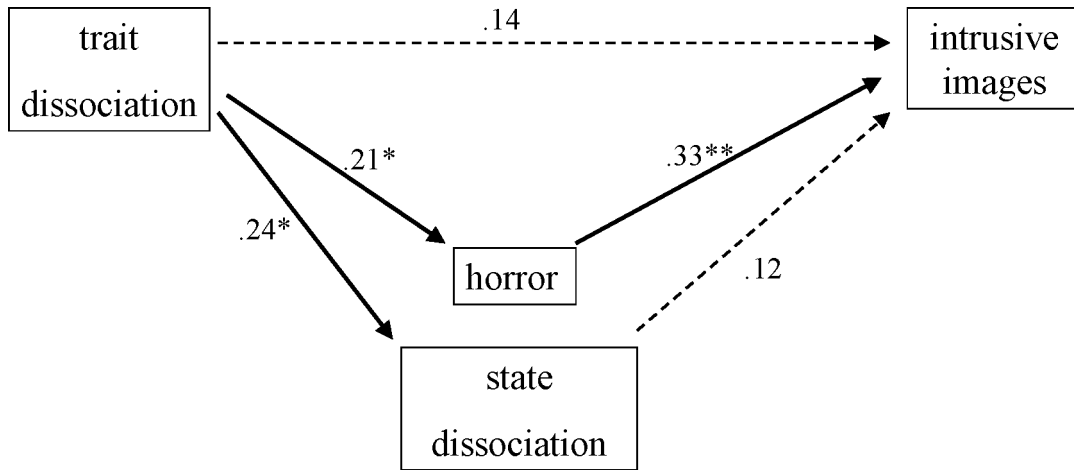
Table 2.

Means and standard deviations for high and low DES C participants

Questionnaire	Low-DES C <i>n</i> = 48	High-DES C <i>n</i> = 49
DES C	19.08 (6.81)	39.59 (5.87)
DSS	2.19 (3.11)	3.41 (3.52)
State horror	2.83 (2.15)	4.70 (2.63)

Note. DES C = Dissociative Experiences Scale C; DSS = Dissociative State Subscale

Figure 1. The overall model based on the current results: State horror mediates the trait dissociation – intrusion frequency association.



* $p < .05$, ** $p = .001$