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BRIEF REPORT

Acute Dissociation Predicts Rapid Habituation of Skin Conductance Responses to Aversive Auditory Probes

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The present study examined how acute dissociation, trait-like dissociative symptoms, and physiological reactivity relate to each other. Sixty-nine undergraduate students were exposed to 14 aversive auditory probes, while their skin conductance responses were measured. A combination of self-reported anxiety and trait-like dissociation was found to predict variability in peritraumatic dissociation levels induced by the aversive probes. Furthermore, high levels of acute dissociation were associated with faster habituation of skin conductance responding, while trait-like dissociation was unrelated to habituation. Interestingly, individuals who reported childhood trauma displayed elevated skin conductance responses. Our findings contribute to the growing body of evidence indicating that subjective feelings of acute dissociation have their objective concomitants, notably fast habituation of physiologic responses.

Peritraumatic dissociation refers to alterations in cognitive and perceptual functioning when faced with a traumatic event. During such an event, depersonalization, derealization, narrowing of attention, time distortion, confusion, and encoding difficulties are thought to occur. Such symptoms are considered to constitute a "partially adaptive response to trauma" (Ladwig et al., 2002, p. 41). According to this view, peritraumatic dissociation serves to protect victims of traumatic events against the immediate impact of such events.

Support for this stance comes from Griffin, Resick, and Mechanic (1997), who reported in their sample of rape victims that peritraumatic dissociative symptoms were related to reduced physiological arousal when talking about the rape (see, for similar findings, Koopman et al., 2003; Morgan et al., 2004; Pole et al., 2005). On the other hand, Nixon, Bryant, Moulds, Felmingham, and Mastrodomenico (2005) found in their sample of motor vehicle accident or physical assault victims that heightened levels of peritraumatic dissociation tended to be accompanied by raised autonomic responsivity (i.e., elevated heart rate; see also Ladwig et al., 2002). However, these studies have investigated the relationship between peritraumatic dissociation during trauma and physiological responsivity at a later point in time (i.e., weeks, months, or years after the trauma). Consequently, they might not actually be documenting the immediate effects of peritraumatic dissociation on physiology. Instead, they might be capturing the more long-term effects of trauma such as PTSD or depression. Thus, the precise connection between peritraumatic dissociation and autonomic responsivity is far from clear and much the same is true for the link between trait-like dissociative symptoms and autonomic reactivity (see e.g., Giesbrecht, Smeets, Merckelbach, & Jelicic, 2007; Sierra et al., 2002).

In sum, then, some authors have found evidence that peritraumatic, but also trait dissociation is accompanied by lowered autonomic reactivity, whereas others have claimed that both types of dissociation are linked to heightened autonomic sensitivity. With this in mind, the aims of the present study were twofold.

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First, we wanted to investigate in a sample of undergraduates whether trait-like dissociative tendencies and peritraumatic (i.e., acute) dissociative symptoms covary with each other. Second, we made a systematic attempt to test whether acute and trait-like dissociative symptoms are, indeed, related to altered physiologic responsivity during aversive stimulation.

METHOD

Participants

Participants were 69 (43 women) undergraduate students enrolled at Maastricht University. Their mean age was 21.10 years ($SD = 2.35$; range = 18 to 28 years). Participants gave written informed consent prior to taking part and received course credit points. The study was approved by the standing ethical committee of the Faculty of Psychology, Maastricht University.

Materials, Measures, and Procedures

A 2.48-second female human scream with an onset to full dB intensity latency of 221 ms was selected as an aversive acoustic probe. This scream was presented 14 times with a variable interstimulus interval ranging from 20 to 40 s at an intensity of 105 dB. Stimuli were presented binaurally via a pair of headphones.

In the present study, skin conductance (SC) was sampled at 40 Hz and measured with two 5-mm silver/silver chloride (Ag/AgCl) electrodes. Skin conductance data were analyzed following the approach outlined by Orr et al. (2003). Thus, three parameters were extracted: Mean resting skin conductance level was obtained by averaging the skin conductance level sampled during the 5-min baseline period, mean responsivity by averaging all skin conductance responses (SCRs) to probes, and the number of trials until two consecutive nonresponse trials (<0.05 microsiemens) occurred. The possible range for this nonresponse criterion is 0 (nonresponse to the first two trials) to 13 (no two consecutive nonresponses).

Participants completed the Dissociative Experiences Scale (DES; Bernstein & Putnam, 1986), which measures dissociative phenomena in daily life, the Childhood Trauma Questionnaire–Short Form (CTQ; Bernstein et al., 2003), intended to measure the frequency of childhood abuse and neglect, the Peritraumatic Dissociative Experiences Questionnaire (PDEQ; Marshall, Orlando, Jaycox, Foy, & Belzberg, 2002), used to measure acute dissociative reactions, and the Profile of Mood States (POMS; McNair, Lorr, & Droppleman, 1992), measuring subjective stress experiences. PDEQ and POMS were administered pertaining to the 15 minutes before the study. Following this, a 5-min SC baseline period was collected. After this baseline period, auditory probes were administered without warning. Next, participants completed the POMS and PDEQ again this time with reference to the interval during which auditory probes were administered. In the present study, the POMS tension–anxiety subscale was employed as a measure of subjectively experienced anxiety.

RESULTS

Self-Report Measures

Table 1 shows mean DES, PDEQ, and CTQ scores. Acute dissociation, as indexed by the PDEQ, significantly increased after the manipulation as compared to the baseline measure of acute dissociative symptoms, $t(68) = 2.76$, $p < .01$. Moreover, POMS tension–anxiety scores increased significantly from 6.12 ($SD = 3.75$) prior to 9.58 ($SD = 4.51$) following the manipulation, $t(68) = 6.17$, $p < .01$.

Table 1 also shows zero-order correlations between dissociation measures, childhood trauma, and subjective distress prior and after the aversive probe manipulation. To examine whether an increase in subjective distress irrespective of baseline distress could predict dissociation measures, partial correlations were calculated while statically controlling for the POMS subscale tension–anxiety at baseline (see Table 1). After controlling for baseline distress, only PDEQ scores were related to POMS subscales. Moreover, trait dissociation, as measured with the DES, correlated with post-manipulation PDEQ scores ($r = .52$, $p < .01$). This correlation remained intact even when premanipulation PDEQ scores were taken into account ($pr = .34$, $p < .01$).

In a next step, we investigated the unique influence of trait dissociation, childhood trauma, gender, and age on postmanipulation acute dissociation. Thus, a multiple regression analysis was conducted with postmanipulation PDEQ scores as dependent variable. In a first step, we entered PDEQ baseline scores to statistically control for individual differences in PDEQ that were unrelated to our manipulation. Next, we proceeded in a stepwise

Table 1. Pearson Product-Moment Correlations Between Self-Report Measures

				POMS Tension–anxiety		
		M	*SD*	Pre-	Post-	Partial
PDEQ	Pre-	1.29	0.44	.62*	.43*	.28*
	Post-	1.43	0.45	.41*	.56*	.42*
DES		20.36	9.62	.38*	.32*	.12
CTQ		35.59	10.22	.31*	.12	−.02

Note. PDEQ = Peritraumatic Dissociative Experiences Questionnaire before (pre-) and after (post-) the probes; DES = Dissociative Experiences Scale; CTQ = Childhood Trauma Questionnaire; POMS = Profile of Mood States. Only relevant correlations are shown. Partial correlations, with the postmanipulation POMS tension–anxiety subscale while controlling statistically for subscale score prior to the manipulation, are also presented (partial).
*$p < .05$ (two-tailed).

Table 2. Summary of Stepwise Multiregressions on (Postmanipulation) Peritraumatic Dissociative Experience Questionnaire Scores

Step		*B*	*SE*	ß	*t*
1	PDEQ (Premanipulation)	0.52	0.11	.50	4.70**
2	PDEQ (Premanipulation)	0.33	0.11	.32	2.98**
	POMS Tension–anxiety (Postmanipulation)	0.04	0.01	.42	3.92**
3	PDEQ (Premanipulation)	0.18	0.12	.18	1.53
	POMS Tension–anxiety (Postmanipulation)	0.04	0.01	.39	3.75**
	DES	0.01	0.01	.30	2.78**

Note. PDEQ = Peritraumatic Dissociative Experiences Questionnaire; POMS = Profile of Mood States; DES = Dissociative Experiences Scale.
$^{**}p < .01$ (two-tailed).

Table 3. Pearson Product-Moment Correlations Between Acute and Trait-Like Dissociation and Skin Conductance Responses

		Skin conductance		
		Baseline	Mean SCR	Habituation
PDEQ	Pre-	−.13	.03	−.02
	Post-	−.21	−.11	−.26*
DES		.02	.00	−.11
CTQ		.11	.33*	.20

Note. SCR = skin conductance response; PDEQ = Peritraumatic Dissociative Experiences Questionnaire; DES = Dissociative Experiences Scale; CTQ = Childhood Trauma Questionnaire. Only relevant correlations are shown.
$^{*}p < .05$ (two-tailed.)

fashion. Table 2 shows the results of this analysis, which indicated that baseline PDEQ scores accounted for 25%, POMS tension–anxiety postmanipulation scores for a further 14%, and DES scores for another 6.5% of the variance in acute dissociation (i.e., PDEQ postmanipulation). No other variables were significantly related to acute dissociation and neither POMS tension–anxiety postmanipulation scores nor DES scores interacted with gender.[1]

Physiologic Responses

Table 3 shows zero-order correlations between dissociation measures, childhood trauma, baseline skin conductance levels, average SCR, and the habituation index. Dissociation measures and childhood trauma were unrelated to baseline skin conductance levels. Moreover, acute dissociation, as measured by the postmanipulation PDEQ, predicted faster habituation, whereas childhood trauma was related to heightened mean skin conductance responses.[2]

DISCUSSION

Three important findings of the present study were that, first, with laboratory procedures, moderate levels of acute dissociation can be readily elicited in healthy individuals. Second, anxiety, as indexed by the POMS tension–anxiety subscale and a general propensity to dissociate, as measured by the DES, were the two factors that accounted for the variance in acute dissociative symptoms elicited in this way. Third, although one may expect the frequency of childhood trauma to contribute heightened levels of acute dissociation, this was not borne out by our data.

Heightened levels of acute dissociation during our aversive manipulation were related to faster habituation of skin conductance responses to aversive auditory stimuli. This pattern of findings is consistent with the view that peritraumatic dissociation reflects altered physiologic responding during stressful events (Koopman et al., 2003). This has also been described as "the shut-down symptomatology typically characteristic of dissociative states" (Simeon, Guralnik, Knutelska, Yehuda, & Schmeidler, 2003, p. 93). To the best of our knowledge, the present study is the first one suggesting that peritraumatic dissociative symptoms may speed up habituation of physiologic responses. This finding supports the notion that peritraumatic dissociation might be an initially successful coping strategy during trauma exposure.

The present study has a number of limitations. First, our study relied on healthy volunteers. Second, we employed a moderately stressful task of a limited duration. Third, we strongly relied on,

[1] Including the three physiological indexes (i.e., baseline SC levels, average SCR, and habituation) in the regression analysis did not significantly improve the prediction.

[2] Regression analyses predicting mean SC responses and SC habituation from trait and acute dissociation, childhood trauma, gender, and age did not yield any additional information as compared to zero-order correlations. Excluding SC nonresponders ($n = 3$) from the analysis did not significantly alter the correlation between postmanipulation PDEQ and faster habituation (Fisher's $z = .34$, *ns*), nor did it affect the correlation between childhood trauma and average SCR (Fisher's $z = .20$, *ns*).

albeit widely validated, self-report measures. Nevertheless, childhood trauma especially may be subject to the context of administration effects leading to both over- and underreporting. Fourth, our study is silent about the precise causal relationships involved in peritraumatic dissociation and fast habituation. In accordance with a defense interpretation of dissociation, it is tempting to argue that one (i.e., dissociation) leads to the other (i.e., fast habituation), but an alternative interpretation would be that both are parallel phenomenological manifestations of a third underlying phenomenon (e.g., a state of shut down; Simeon et al., 2003).

To conclude, the present study shows that acute dissociation can be readily elicited and studied in the laboratory. Moreover, subjective distress (i.e., anxiety) and a propensity to dissociate (i.e., trait dissociation) were identified as the two main factors that determine whether an individual is likely to dissociate during aversive stimulation. In addition, the present findings contribute to the growing body of evidence showing that the subjective feeling of peritraumatic dissociation has its objective (i.e., psychophysiological) concomitants. Specifically, peritraumatic dissociation is related to faster habituation of autonomic responding.

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