



## Skin conductance and memory fragmentation after exposure to an emotional film clip in depersonalization disorder

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### ABSTRACT

It is often assumed that when confronted with an emotional event, patients with DPD inhibit information processing. It is also thought that this fosters memory fragmentation. This hypothesis has not been tested in chronic depersonalization. The aim of this study was to investigate the temporal pattern of autonomic responding to emotional material in depersonalization disorder, along with concomitant deficits in subjective and objective memory formation (i.e., difficulties to form a coherent narrative consisting of an ordered sequence of events). Participants with depersonalization disorder ( $n=14$ ) and healthy control participants ( $n=14$ ) viewed an emotional video clip while their skin conductance (SC) levels were measured. Peritraumatic dissociation was measured before and after the clip, and memory performance was measured 35 min after viewing. Compared to controls, depersonalized participants exhibited a distinctly different temporal pattern of autonomic responding, characterized by an earlier peak and subsequent flattening of SCLs. Maximum SCLs did not differ between the two groups. Moreover, unlike the control group, depersonalized participants showed no SC recovery after clip offset. In terms of memory performance, patients exhibited objective memory fragmentation, which they also reported subjectively. However, they did not differ from controls in free recall performance. Apparently, emotional responding in DPD is characterized by a shortened latency to peak with subsequent flattening and is accompanied by memory fragmentation in the light of otherwise unremarkable memory functioning.

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### 1. Introduction

Depersonalization disorder (DPD) is characterized by persistent or recurrent episodes of “detachment or estrangement from one’s self” (p. 530; American Psychiatric Association, 2000). The Diagnostic and Statistical Manual, Fourth Edition, Text Revision (DSM-IV-TR) (American Psychiatric Association, 2000) classifies DPD as one of the dissociative disorders, but some scholars have argued that it is an anxiety or mood disorder (Baker et al., 2003; World Health Organization, 1992). However that may be, there is evidence that patients with DPD exhibit deficits in emotion processing. For example, Sierra et al. (2002) reported that DPD patients have reduced magnitudes and increased latencies of skin conductance responses to static aversive stimuli, as compared to both healthy controls and patients with anxiety disorder. It has also been suggested that the chronic state of depersonalization in DPD hampers the formation of emotional memories, thereby promoting memory fragmentation (van

der Kolk and Fisler, 1995). Thus, when confronted with an emotional event, patients with DPD are thought to inhibit information processing (Ladwig et al., 2002), which in turn leads to difficulties to form a coherent narrative consisting of an ordered sequence of events. In line with this assumption, some trauma victims say they experience difficulties in recalling the temporal order of events (van der Kolk and Fisler, 1995) and patient with DPD report temporal disintegration of autobiographical memories (Simeon et al., 2007). Germane to this is also a PET study by Simeon et al. (2000) that is suggestive of deficient sensory integration in DPD. However, no study has directly looked at emotional memories in DPD using an objective measure of memory fragmentation (for a review, see Giesbrecht et al., 2008a).

With these considerations in mind, the aim of the present study was twofold. First, we wanted to investigate the time course of autonomic responding to emotional material in DPD. Specifically, we were interested in the dynamics of emotional responding during an emotional video clip of 12:30 min. An emotional stimulus with a relatively long duration as employed in the current study provides an opportunity to test the hypothesis that an initial and brief increase in arousal would be followed by shutdown and blunting in those who dissociate (Simeon, 2004). Such a process cannot be captured, and therefore has not been addressed, by the studies which have either used brief stimuli (Sierra et al., 2002; Lemche et al., 2007) or

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peripheral neurohormonal measures obtained pre- and post-stress which only capture the “net” response to the stressor (Giesbrecht et al., 2007).

Second, we hypothesized that patients with DPD might exhibit memory deviations related to overall recall and temporal sequencing (i.e., fragmentation). In addition, we were interested in whether such changes would be associated with autonomic responsivity.

## 2. Methods

### 2.1. Participants

Participants were 14 patients with Depersonalization Disorder (DPD) and 14 healthy controls (HC). The study was approved by the Institutional Review Board of Mount Sinai School of Medicine, New York and was conducted at this institution. All participants gave written informed consent prior to participation in the study. Participants received \$60 for participation. The diagnosis of DPD was established by Daphne Simeon, MD using the Structured Clinical Interview for Dissociative Disorders (SCID-D-R; Steinberg, 1994), a well-validated interview of dissociative symptoms and disorders. Participants diagnosed with DPD, as defined by the DSM-IV-TR (American Psychiatric Association, 2000) experienced persistent or recurrent episodes of depersonalization associated with significant distress and/or dysfunction and these episodes did not occur in the context of another psychiatric or medical condition, including another dissociative disorder. As per SCID-D-R guidelines, participants with elevated amnesia or identity alteration scores did not receive a DPD diagnosis, notably these patients would receive the diagnosis of dissociative identity disorder or dissociative disorder not otherwise specified. Participants with a lifetime history of psychotic disorders, current substance use disorders, and/or major medical or neurological disorders were excluded from the study. DPD participants taking psychotropic medications were not excluded ( $n=6$ ). Medications and daily doses were sertraline 50 mg, venlafaxine 50 mg (two patients), quetiapine 50 mg in combination with rimegepant 8 mg, tranylcypromine 70 mg, and donepezil 5 mg in combination lamotrigine 50 mg. The remaining DPD patients did not take any psychotropic medication ( $n=8$ ). Current comorbidity in the DPD groups were generalized anxiety disorder ( $n=4$ ), obsessive compulsive disorder ( $n=2$ ), major depressive disorder ( $n=2$ ), panic disorder ( $n=2$ ), dysphoria ( $n=1$ ), claustrophobia ( $n=1$ ), dysthymia ( $n=1$ ), social phobia ( $n=1$ ), anxiety disorder NOS ( $n=1$ ), and seasonal affective disorder ( $n=1$ ).

### 2.2. Self-report questionnaires

#### 2.2.1. Dissociative Experiences Scale (DES; Cronbach's $\alpha=0.95$ ; Bernstein-Carlson and Putnam, 1993)

The DES is a 28-item self-report scale which asks respondents to indicate the frequency of various dissociative experiences, rated on a 0% to 100% scale scored in 10% increments. In a meta-analytic study, van IJzendoorn and Schuengel (1996) provided evidence for the sound psychometric properties of the DES. In addition to the DES total score and following the three-factor solution proposed by Carlson et al. (1991), we calculated separate subscale scores for amnesia (Cronbach's  $\alpha=.67$ ), absorption (Cronbach's  $\alpha=.91$ ), and depersonalization/derealization (Cronbach's  $\alpha=.88$ ).

#### 2.2.2. Cambridge Depersonalization Scale (CDS; Cronbach's $\alpha=0.97$ ; Sierra and Berrios, 2000)

The CDS consists of 29 items which ask the respondent to rate depersonalization symptoms over the “last 6 months” on a 5-point frequency scale (anchors: 0 = never; 4 = all the time) and a 6-point duration scale (anchors: 1 = few seconds; 6 = more than a week). All CDS frequency and duration scores are summed to obtain a total score. The scale is able to differentiate patients with DPD from other patient groups and from healthy controls. Sierra and Berrios (2000) report sound psychometric properties for the CDS.

#### 2.2.3. Childhood Trauma Questionnaire (CTQ; Cronbach's $\alpha=0.93$ ; Bernstein et al., 2003)

The CTQ is a widely used self-report scale of childhood interpersonal trauma, rated on a 5-point scale. In the present study, we employed the short form, which consists of 25 items, for which Bernstein et al. (2003) reported satisfactory psychometric qualities. Factor analysis has revealed 5 factors, accounting for 48% of the total variance, with each factor consisting of 5 items. These 5 factors are emotional abuse, physical abuse, emotional neglect, sexual abuse, and physical neglect.

#### 2.2.4. Beck Depression Inventory (BDI; Cronbach's $\alpha=0.96$ ; Beck et al., 1961)

The BDI is a 21-item multiple-choice self-report inventory which measures the presence and degree of depression in adolescents and adults. Its items pertain to depression symptoms such as hopelessness and irritability, cognitions such as guilt or feelings of being punished, as well as physical symptoms such as fatigue, weight loss, and lack of interest in sex. The BDI is one of the most widely used measures of depression.

#### 2.2.5. Beck Anxiety Inventory (BAI; Cronbach's $\alpha=0.96$ ; Beck and Steer, 1990)

The BAI assesses anxiety, and was specifically designed to minimize the overlap between depression and anxiety. Both physiological and cognitive components of anxiety are addressed in the 21 items describing subjective, somatic, or panic-related

symptoms. The BAI differentiates well between anxious and non-anxious groups in a variety of clinical settings and is appropriate for various adult mental health samples.

#### 2.2.6. Peritraumatic Dissociative Experiences Questionnaire (PDEQ; Cronbach's $\alpha=0.72-0.78$ ; Marshall et al., 2002)

The PDEQ is the most widely used self-report measure of peritraumatic dissociative reactions and consists of 8 items. These items quantify the amount of acute dissociation. Respondents are asked to indicate on a 5-point scale (anchors: 1 = not at all true, 5 = extremely true) to what extent they experienced particular dissociative symptoms during a specific event (e.g., “I felt confused or couldn't make sense of what was happening”). Items were summed to obtain a PDEQ total score. The PDEQ was administered twice, immediately before (Cronbach's  $\alpha=0.78$ ) and after (Cronbach's  $\alpha=0.72$ ) participants had been exposed to the video clip (i.e., 5 min post-stimulus offset, see below).

#### 2.2.7. Profile of Mood States (POMS; Cronbach's $\alpha=0.81-0.90$ ; McNair et al., 1992)

The POMS is a commonly used questionnaire designed to assess transient, distinct mood states. The original version consists of 65 items rated on a 5-point scale ranging from “not at all” to “extremely.” In the present study, we employed the POMS tension-anxiety subscale as a measure of state anxiety. The POMS referred to how participants “feel at the moment,” and was administered two times, immediately before (Cronbach's  $\alpha=0.90$ ) and after (Cronbach's  $\alpha=0.81$ ) the video clip (i.e., 5 min post-stimulus offset, see below).

### 2.3. Stimulus material

Stimulus material consisted of a clip from the Hollywood movie “The Silence of the Lambs” with a duration of 12:30 min.<sup>2</sup> The clip starts with alternating scenes from within the house where a male holds a woman captive and a group of police officers preparing to raid another house. Next, a female police officer rings the bell at the house where the victim is held captive, while the other police officers raid the other house and realize that they are at the wrong place. After a short chat with the hostage-taker, the female police officer draws her gun and chases the man through the cellar. She finds the victim who is being held captive and eventually kills the man. Movie clips tend to elicit strong emotional arousal in participants (Jansen and Frijda, 1994). Previous work has also shown that participants evaluate this particular video clip as emotionally provocative. Accordingly, this clip is known to elicit an increase in anxiety (Rottenberg et al., 2007). This makes this particular clip particularly suitable in the context of the present study. Specifically, it is thought that patient with DPD dissociate as a response to increases in anxiety. Thus, one would expect the present clip to provoke dissociative symptoms. These heightened levels of depersonalization and derealization are thought to go along with an inhibition of information processing and physiological responding, which are the subject of investigation in the present study.

Furthermore, we selected this specific clip as it contains a relatively long scene which builds up tension in a gradual fashion. This makes this video clip suitable to investigate emotional processing in patients with DPD (Simeon and Abugiel, 2006) and its autonomic concomitants over time.

### 2.4. Psychophysiological measure

In the present study, skin conductance was measured with two BioPac EL507 Disposable Electrodermal Electrodes that were filled with isotonic gel and were placed on the middle phalanx of middle and ring finger of the non-dominant hand. Before electrodes were attached, participants rinsed their hands with distilled water (Fowles et al., 1981). Skin conductance was recorded using a BioPac GSR100C with gain of 5  $\mu$ S/V and a low-pass filter at 10 Hz. The signal was sampled at 200 Hz by a BIOPAC MP150 (BioPac Systems, Goleta, CA) system connected to a data-acquisition computer running the Acknowledge v3.8.2 software package. Skin conductance data for one HC participant was lost due to equipment malfunctioning.

### 2.5. Measures of memory performance

The following three measures were administered, in the order below, from 35 to 60 min after stimulus offset. One DPD patient was unable to complete measures of memory performance.

#### 2.5.1. Subjective memory fragmentation (Kindt and van den Hout, 2003)

Subjective memory fragmentation refers to the subjective (i.e., meta-memory) experience of fragmentation and does not necessarily reflect actual (i.e., objective) fragmentation. Subjective fragmentation was quantified using three 100-mm visual analogue scale items. Participants had to indicate the “snap-shot” character of their recollections of the video clip. The items were as follows: “How much does your memory of the video exist of fragmented pieces as opposed to a whole entity?”, “How much does your memory of the video exist of visual images?”, and “How intense are emotions in your memory of the video?”. Items were summed to obtain a measure of subjective memory fragmentation.

<sup>2</sup> The film clip is available from the first author.

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