Psychiatry Research 216 (2014) 230–235

Contents lists available at ScienceDirect

Psychiatry Research

journal homepage: www.elsevier.com/locate/psychres

Altered orientation of spatial attention in depersonalization disorder

Julia Adler[a,*], Manfred E. Beutel[a], Achim Knebel[a], Stefan Berti[b], Josef Unterrainer[c], Matthias Michal[a]

[a] Department of Psychosomatic Medicine and Psychotherapy, University Medical Center Mainz, Untere Zahlbacher Str. 8, D-55131 Mainz, Germany
[b] Department of Clinical Psychology and Neuropsychology, Institute of Psychology, Johannes Gutenberg-University Mainz, Germany
[c] Medical Psychology and Medical Sociology, University Medical Center Mainz, Germany

ARTICLE INFO

Article history:
Received 2 May 2013
Received in revised form
15 October 2013
Accepted 10 February 2014
Available online 19 February 2014

Keywords:
Depersonalization disorder
Dissociative disorder
Spatial attention
Benefits
Costs
Reaction times

ABSTRACT

Difficulties with concentration are frequent complaints of patients with depersonalization disorder (DPD). Standard neuropsychological tests suggested alterations of the attentional and perceptual systems. To investigate this, the well-validated Spatial Cueing paradigm was used with two different tasks, consisting either in the detection or in the discrimination of visual stimuli. At the start of each trial a cue indicated either the correct (valid) or the incorrect (invalid) position of the upcoming stimulus or was uninformative (neutral). Only under the condition of increased task difficulty (discrimination task) differences between DPD patients and controls were observed. DPD patients showed a smaller total attention directing effect (RT in valid vs. invalid trials) compared to healthy controls only in the discrimination condition. RT costs (i.e., prolonged RT in neutral vs. invalid trials) mainly accounted for this difference. These results indicate that DPD is associated with altered attentional mechanisms, especially with a stronger responsiveness to unexpected events. From an evolutionary perspective this may be advantageous in a dangerous environment, in daily life it may be experienced as high distractibility.

1. Introduction

Depersonalization disorder (DPD) is characterized by persistent or recurrent feelings of depersonalization (i.e. experiences of unreality, detachment, or being an outside observer with respect to one's thoughts, feelings, sensations, body, etc.) and/or derealization (individuals or objects are experienced as unreal, dreamlike, foggy, lifeless, or visually distorted). During these experiences reality testing remains intact. The symptoms are not caused by direct physiological effects of drugs or other medical conditions and are not better accounted for by another mental disorder (e.g. panic disorder or depression). Finally, these symptoms cause clinically significant distress or impairment (Spiegel et al., 2011; American Psychiatric Association, 2013). The prevalence of DPD in the general population is around 1% (Lee et al., 2012). Both genders are equally affected (Simeon, 2004). The onset of the disorder is usually before age 25, the course is typically chronic (Baker et al., 2003; Simeon et al., 2003). DPD has a high comorbidity with depression and anxiety disorders, however, comorbidity does not explain the severity of depersonalization (Simeon, 2004; Medford et al., 2005; Sierra et al., 2012). Impairment of cognitive functions is among the main complaints of DPD patients: patients complain about mind emptiness, racing thoughts, memory impairments, impairment of visual imagery and concentration (Lambert et al., 2001; Hunter et al., 2003; American Psychiatric Association, 2013). With regard to functions in DPD patients two previous studies demonstrated subtle alterations of the attentional and perceptual systems, but only little cognitive disturbances (Giesbrecht et al., 2008). In their first study, Guralnik et al. (2000) found a worse performance of DPD patients as compared to healthy persons for measures of attention, short-term visual and verbal memory, and spatial reasoning (Guralnik et al., 2000). In their second study they found an intact general intelligence and working memory for DPD patients. However, subtle impairments in tasks of short-term memory and selective attention emerged, as severity of depersonalization was correlated with increased distractibility during recall. Important to note, these findings were not mediated by the severity of anxiety and/or depression. The authors concluded that DPD may be associated with disruptions in the early perceptual and attentional processes (Guralnik et al., 2007). Impairments of short-term memory tasks were attributed to problems in processing new information. However, due to

* Corresponding author. Tel.: +49 6131 176084; fax: +49 6131 175563.
E-mail address: julia.adler@unimedizin-mainz.de (J. Adler).

http://dx.doi.org/10.1016/j.psychres.2014.02.021
0165-1781

methodological limitations of the applied standard neuropsychological tests, it was not possible to differentiate, whether these cognitive impairments were due to deficits of short-term memory or attention.

The aim of the present study was to test whether DPD affects attentional processing stages as hypothesized by Guralnik et al. (2007). More specifically, we investigated whether DPD is associated with altered mechanisms of selective spatial attention. Selective attention is defined as the ability to select the behavioral relevant information from the vast amount of internal and/or external information (enhancement of processing) and to ignore the rest (suppression of processing) (Posner, 1980; Hillyard et al., 1998). A common and well established experimental task for investigating selective attention is the “Spatial Cueing Paradigm” by Posner and Cohen (1984). In the Spatial Cueing paradigm participants are instructed to detect and to respond to targets presented on the left or right side of a fixation cross on a screen. Prior to the target, a centrally located cue indicates the most likely location for the subsequent target. In most of the trials the prediction of the cue is valid, i.e. it indicates the correct target location. However, in some of the trials invalid cues are given, indicating the incorrect location of the target. By testing the responses to targets following a non-directional (i.e. neutral) cue, a baseline score of the participants' reaction time can be measured. A common finding is that response times (RTs) to targets are shorter after valid cues as compared to targets after invalid cues (e.g. Eimer, 1996; Luck et al., 1994; Mangun and Buck, 1998). This effect is considered as the result of a covert shift of attention to the expected target location. This total attention directing effect can be caused either by enhanced target processing at cued location (“RT benefits”) or by suppression of processing of targets at uncued location (“RT costs”). RT benefits of directing attention are reflected in faster RTs for valid as compared to neutral trials, whereas RT costs are reflected in increased RTs for invalid compared to neutral trials (see Fig. 1).

The rationale of our study paradigm was based on the following assumption. If there are any alterations within the attentional systems in DPD patients, then they should manifest themselves especially when the attentional system is subjected to increased amounts of demand. Therefore the Spatial Cueing paradigm was used with two conditions differing in their demand on the attentional system: an easy task with low attentional demand in a detection condition and a difficult task with high attentional demand in a discrimination condition. Both conditions trigger spatial orientation of attention (i.e., to the left or to the right), the additional attentional challenge in the discrimination task concerns the attention to the orientation of the stimuli (target vs. non-target). We hypothesized altered attentional mechanisms in DPD patients, mainly in the challenging discrimination condition. Further, we analyzed whether the altered attentional mechanisms result from smaller processing benefits of stimuli on attended locations (RT benefits) or from a lack of suppression of stimulus processing on unattended locations (RT costs).

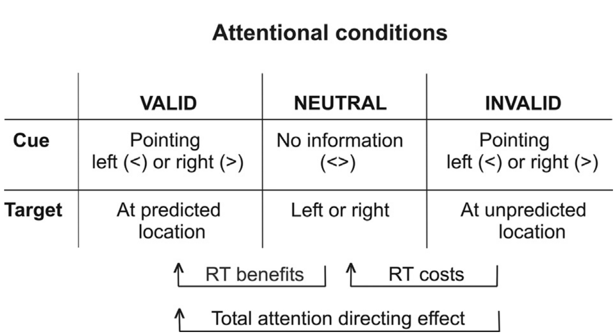

Fig. 1. Attentional conditions depending on cue validity and corresponding attention effects. Total attention directing effect (invalid minus valid trials), RT benefits (neutral minus valid trilas), RT costs (invalid minus neutral trials).

Table 1
Sample characteristics.

	DPD patients ($n=16$) Mean (S.D.)	Healthy controls ($n=17$) Mean (S.D.)	Test
Age in years	26.9 (4.7)	25.8 (2.4)	$p=0.87$
Sex, male	56%; 9 males	53%; 9 males	$p=0.85$
Years of education (at school)	12.4 (1.2)	13 (0)	$p=0.08$
CDS	128.7 (39.0)	11.9 (11.5)	$p<0.0001$
BDI-II	28.4 (10.1)	5.8 (5.4)	$p<0.0001$
STAI Trait	60.7 (10.2)	37.9 (11.0)	$p<0.0001$

t-Test for continuous variables, χ^2 test for categorical variables; years of education (without university or professional education); CDS, Cambridge Depersonalization Scale; BDI-II, Beck Depression Inventory; STAI, State-Trait Anxiety Inventory (Trait).

2. Participants and methods

2.1. Participants

The study was approved by the local ethics committee and all participants gave informed consent. The sample consisted of 16 patients with DPD (nine males) and 17 healthy controls (HC, nine males) with a mean age of 26 years (range 20–35 years). The DPD patients were recruited from our DPD clinic, healthy controls by research advertisements. The diagnosis of DPD was established by M.M. according to the German version of the Structured Clinical Interview for Dissociative Disorders (Gast et al., 2000). All patients met diagnostic criteria of depersonalization disorder according to DSM-IV (300.6) respectively depersonalization-derealization syndrome (ICD-10 F48.1). Diagnoses of comorbid conditions were based on DSM-IV diagnostic criteria. All participants were administered the German versions of the Cambridge Depersonalization Scale (Sierra and Berrios, 2000; Michal et al., 2004), the Beck Depression Inventory-II (BDI; Beck et al., 1996) and the State and Trait Anxiety Inventory (STAI; Spielberger et al., 1970). Participants with a lifetime history of any psychotic disorder, current substance abuse, major medical disorders, or history of head trauma were excluded. Table 1 characterizes the study participants. There was no difference between the groups concerning age, years of education and gender. Regarding years of schooling, all healthy controls had high-school graduation (13 years of schooling) compared to 10 from 13 years of schooling for the DPD patients. The mean age at onset of DPD was 16.0 ± 5.9 years (range 5–25 years), and the mean duration of DPD was 10.8 ± 8.1 years (range 1–24 years). In addition to the diagnosis of DPD the criteria of the following current diagnoses were fulfilled: $n=11$ diagnoses of major depression and/or dysthymia, $n=4$ panic disorder/agoraphobia, $n=4$ generalized anxiety disorder, $n=4$ social phobia, $n=3$ obsessive compulsive disorder, and $n=4$ personality disorders. Concerning medical disorders $n=2$ suffered from chronic tinnitus and $n=1$ from migraine without aura. With respect to current intake of medication, nine patients were taking psychotropic drugs: seven patients took antidepressants, two cases supplemented by lamotrigine and two by low dose atypical antipsychotics.

2.2. Test of selective attention

The Spatial Cueing paradigm (Posner and Cohen, 1984), described in Section 1, was used as a detection and as a discrimination condition. These two task conditions were presented consecutively; the order of the two conditions was balanced across participants. Figs. 2 and 3 show the schematic description of the experimental task.

In both task conditions the participants sat in front of a computer screen. They were instructed to fixate a cross in the center of the screen. Both task conditions, detection and discrimination, had identical stimulation: in 448 of 520 trials (per task condition, divided in four blocks) one of two types of event stimuli (Gabor patches, see Fig. 2) occurred left or right from the fixation cross, for 100 ms. The Gabor patches differed with respect to their orientation (296 trials with 0° orientation and 152 trials with 45° orientation). In the discrimination condition, participants were instructed to discriminate between these two types of events and to respond only to stimulus defined as the target (Gabor patch with 0° orientation) and to ignore the non-target stimulus (Gabor patch with 45° orientation). In the detection condition, however, both types of event stimuli were defined as targets and had to be detected without discrimination (see Fig. 3). Responses were made