Journal of Anxiety Disorders 25 (2011) 490–497

Contents lists available at ScienceDirect

Journal of Anxiety Disorders

Effects of cognitive self-consciousness on visual memory in obsessive–compulsive disorder

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ARTICLE INFO

Article history:
Received 26 August 2010
Received in revised form
10 December 2010
Accepted 11 December 2010

Keywords:
Visual memory
Obsessive–compulsive disorder
Cognitive self-consciousness
Meta-cognition

ABSTRACT

Previous research has documented high trait cognitive self-consciousness (CSC) in obsessive–compulsive disorder (OCD). It remains unclear whether elevated CSC levels can also explain cognitive performance deficits that have frequently been found in OCD. This study examined whether experimentally heightened CSC affects visual memory performance in OCD. OCD participants and healthy controls completed a complex figure test under three experimental conditions: simultaneously focusing on their thoughts (= CSC condition), simultaneously focusing on acoustic stimuli (= dual-task condition), and without a parallel task (= standard condition). In the OCD sample both the CSC condition and the dual-task condition reduced memory performance compared to the standard condition, whereas in controls only the dual-task condition led to reduced performance. Results indicate that raising CSC in OCD has a deteriorating effect on memory encoding that parallels the effect of a secondary task. High CSC and its effects on cognitive performance might be amenable to meta-cognitive treatment approaches.

1. Introduction

Neuropsychological functioning has been widely investigated in OCD. One of the most consistently reported findings is an impairment in visuospatial memory (for reviews, see Kuelz, Hohagen, & Voderholzer, 2004; Muller & Roberts, 2005). Savage et al. (1999) demonstrated that deficits in nonverbal memory were mediated by impaired organizational strategies. However, it remains unclear how these cognitive deficits are linked to the psychopathological characteristics of OCD as only few and low associations with symptom severity have been found (Savage et al., 1999; Sawamura, Nakashima, Inoue, & Kurita, 2005; Zitterl et al., 2001).

Recent psychopathological research deals with the role of cognitive self-consciousness (CSC) as a (meta-)cognitive trait in OCD. CSC is the tendency to be aware of and monitor one's thoughts and cognitive processes (e.g., "I pay close attention to the way my mind works", "I monitor my thoughts"). CSC has repeatedly been found to be positively associated with obsessive–compulsive disorder and obsessive–compulsive symptoms (Goldman et al., 2008; Hermans, Martens, De Cort, Pieters, & Eelen, 2003; Janeck, Calamari, Riemann, & Heffelfinger, 2003; Wells & Papageorgiou, 1998). It has also been found that CSC is present in greater intensity in OCD subjects than in healthy controls (e.g., García-Montes, Pérez-Álvarez, Soto Balbuena, Perona Garcelán, & Cangas, 2006; Hermans et al., 2003; Janeck et al., 2003). While other metacognitive beliefs assessed with the MCQ (e.g., positive beliefs about worry, cognitive confidence) are not specific to OCD, CSC distinguishes persons with OCD from individuals with GAD or other emotional disorders (Cartwright-Hatton & Wells, 1997).

So far, only a few studies have addressed the relationship of high trait CSC and cognitive performance deficits in OCD. Exner, Martin, and Rief (2009) could demonstrate that the dimension "Rumination" (tendency to focus on cognitive processes) of the German version (Emmelkamp & van Oppen, 2000) of the Padua Inventory (Sanavio, 1988) was associated with deficits in episodic memory even when depression and symptom severity were controlled. Another study revealed that CSC mediated group differences between OCD participants and healthy controls in episodic memory (Exner, Kohl, et al., 2009). Two studies found that CSC was negatively associated with implicit learning performance (Goldman et al., 2008; Marker, Calamari, Woodard, & Riemann, 2006). Despite these correlational results, the mechanisms by which heightened cognitive self-consciousness and memory processes interact remain unclear. Wells' metacognitive theory of OCD (1997, 2000) conceptualizes CSC as a metacognitive coping strategy that arises from the self-belief that thoughts need to be controlled. Because this goal is difficult or even impossible to achieve, CSC requires a great amount of information processing capacity (for a detailed description see Wells, 1997, 2000). Janeck et al. (2003) and Exner, Kohl, et al. (2009) postulated that being excessively occupied with one's mental processes and thoughts reduces the attention capacity

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doi:10.1016/j.janxdis.2010.12.002

needed for encoding other material and thus could lead to memory deficits. One could conclude that OCD subjects with high CSC are permanently in a state of divided attention. Studies dealing with the effects of divided attention in healthy controls have demonstrated that divided attention has a deteriorating effect on memory performance (e.g., Castel & Craik, 2003; Fernandes & Moscovitch, 2000; Naveh-Benjamin, Guez, & Sorek, 2007). The notion that CSC leads to divided attention might therefore explain poorer memory performance observed in many OCD patients. In order to test this assumption, the present study investigates whether experimentally manipulated CSC has a negative effect on visual memory performance. We hypothesized that experimentally increased CSC will reduce visual memory performances of individuals with OCD in comparison to memory performance when full attention capacity is available. We also hypothesized that the influence of CSC on visual memory performance would be comparable to the effects of a regular dual-task.

2. Methods

2.1. Participants

2.1.1. OCD group

The OCD group consisted of 36 participants (21 female, mean age = 33.3, SD = 12.1) with a current primary diagnosis of OCD according to the DSM-IV (American Psychiatric Association, 1994a). Clinical status was assessed with the German version (Wittchen, Wunderlich, Gruschwitz, & Zaudig, 1997) of the structured clinical interview for DSM-IV (SCID; American Psychiatric Association, 1994b). Although OCD was the major diagnosis in all cases, current comorbid Axis I diagnoses included: depression ($n = 10$), dysthymia ($n = 5$), social phobia ($n = 4$), hypochondriasis ($n = 3$), specific phobia ($n = 2$), panic disorder with agoraphobia ($n = 2$) and general anxiety disorder ($n = 1$). Twenty-two of the OCD participants were currently taking the following psychotropic medications: selective serotonin reuptake inhibitors ($n = 16$), tricyclic antidepressants ($n = 3$), serotonin noradrenalin reuptake inhibitor ($n = 1$), tetracyclic antidepressant ($n = 1$), antipsychotic and selective serotonin reuptake inhibitor ($n = 1$). Exclusion criteria were as follows: current or a history of psychotic disorders (e.g., schizophrenia), bipolar disorder, any drug or alcohol dependence or neurological disturbances (e.g., craniocerebral injury, neurodegenerative diseases). Clinical participants were recruited from an inpatient treatment facility for psychological disorders located in Bad Arolsen, Germany ($n = 30$ inpatients), and through posted flyers and advertisements in the greater Marburg area, Germany ($n = 6$ outpatients).

2.1.2. Healthy control group

The healthy control group consisted of 36 participants (21 female, mean age = 32.8, SD = 9.96) with no current or lifetime Axis I disorder as determined by the SCID. Only participants without a history of neurological disturbances were included. None was taking psychotropic medication. All control participants were recruited through posted flyers and advertisements in the greater Marburg area, Germany.

The OCD group and the healthy control group did not differ with respect to age, years of education, and gender, all $p > .2$. Sociodemographic and clinical characteristics are summarized in Table 1.

2.2. Clinical assessment

All scales are well used German translations from the originals. Severity of obsessive–compulsive symptoms in OCD participants was assessed with the *Yale-Brown Obsessive Compulsive Scale* (*Y-BOCS*) (Goodman, Price, Rasmussen, Mazure, Fleischmann, et al., 1989; German translation: Hand & Büttner-Westphal, 1991), a semi-structured clinician-rated interview. For the original version, high interrater reliability (with $r = .98$ for the total score, $r = .97$ for the obsession subtotal and $r = .96$ for the compulsion subtotal), high internal consistency (ranging from $\alpha = .88$ to $\alpha = .91$; Goodman, Price, Rasmussen, Mazure, Fleischmann, et al., 1989) and good validity (see Goodman, Price, Rasmussen, Mazure, Delgado, et al., 1989) was reported. OCD participants and healthy controls also completed a self-report inventory of OC symptoms, the *Padua Inventory – Washington State University Revision* (Burns, Keortge, Formea, & Sternberger, 1996; German translation: Department of Neuropsychology of the University of Bonn Medical Center, 2002). The *PI-WSUR* is a 39-item self-report measure of obsessive–compulsive symptoms with the following subscales: "Contamination Obsessions and Washing Compulsions", "Dressing/Grooming Compulsions", "Checking Compulsions", "Obsessional Thoughts of Harm to Self/Others" and "Obsessional Impulses of Harm to Self/Others". For the original version, Burns et al. (1996) report adequate test–retest reliabilities for the total score ($r = .76$) and for the subscales ($r = .61$ to $r = .84$) as well as evidence for discriminant validity. Internal consistencies are reported as $\alpha = .92$ for the total scale and between $\alpha = .77$ and $\alpha = .88$ for the subscales. Self-reports of additional depressive symptoms apart from OC symptoms were obtained from the *Beck Depression Inventory – II* (BDI-II; Beck, Steer, & Brown, 1996). For the German version (Kühner, Bürger, Keller, & Hautzinger, 2007) high internal consistency was reported ($\alpha \geq .84$), while test–retest reliability exceeded $r = .75$ in non-clinical samples. Finally, dispositional cognitive self-consciousness was assessed by the *Meta-Cognitions Questionnaire* (MCQ; Cartwright-Hatton & Wells, 1997), subscale "CSC-Expanded" developed by Janeck et al. (2003). High internal consistency ($\alpha = .94$) was reported. The German translation consisted of the original items (Hoyer & Gräfe, 1999) and the translation of the seven additional items conducted by a bilingual colleague as described in Exner, Kohl, et al. (2009).

Table 1
Demographic and clinical characteristics by group.

	OCD ($n = 36$)	Control ($n = 36$)	Statistic	p
Gender Ratio (Female/Male)	21/15	21/15	$\chi^2 = .00$	1
Age (Years)	33.3 (12.1)	32.8 (1.7)	$U = 640.5$	.93
Years of Education	15.8 (3.1)	16.7 (4.2)	$t(70) = -1.026$	.309
Y-BOCS total (Raw Scores)	21.0 (7.1)	–	–	–
Y-BOCS, subscale "Obsession" (Raw Scores)	10.2 (4.5)	–	–	–
Y-BOCS, subscale "Compulsion" (Raw Scores)	10.8 (4.3)	–	–	–
Duration of OCD (Years)	13.3 (12.8)	–	–	–
PI-WSUR (Raw Scores)	89.5 (24.5)	48.4 (7.6)	$U = 40.5$	**<.001**
MCQ, subscale "Cognitive Self-Consciousness – Expanded" (Raw Scores)	34.2 (5.6)	25.4 (6.8)	$t(70) = .727$	**<.001**
BDI-II (Raw Scores)	19.9 (10.6)	4.1 (3.9)	$U = 86$	**<.001**

Note. Means and standard deviations (in parentheses) unless indicated otherwise. Y-BOCS = Yale-Brown Obsessive Compulsive Scale, PI-WSUR = Padua Inventory – Washington State University Revision; MCQ = Meta-Cognitions Questionnaire; BDI-II = Beck Depression Inventory – II.