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Psychiatry Research

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

Two types of impairments in OCD: Obsessions, as problems of thought suppression; compulsions, as behavioral-executive impairment



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ARTICLE INFO

Article history:

Received 18 November 2011

Accepted 7 September 2012

Available online 20 November 2013

Keywords:

OCD

Dysexecutive syndrome

DEX

Thought suppression

WBSI

ABSTRACT

Impairments in executive functioning have been identified as an underlying cause of Obsessive-Compulsive Disorder (OCD). Obsessive patients attempt to suppress certain unwanted thoughts through a mechanism that Wegner referred to as 'chronic thought suppression', whereas compulsive patients are unable to inhibit their rituals. We tested 51 OCD patients using the Yale-Brown Obsessive Compulsive Scale (Y-BOCS), the White Bear Suppression Inventory (WBSI) and the Dysexecutive Questionnaire (DEX). Executive functions were tested using a cognitive test battery. We found that the total WBSI score was correlated with the Y-BOCS obsessive score but not with the Y-BOCS compulsive score. A stronger correlation was observed between the Y-BOCS obsessive score and the 'unwanted intrusive thoughts' factor based on Blumberg's 3-factor model of the WBSI. The total WBSI score was not correlated with the cognitive test results. The DEX score was significantly correlated with the Y-BOCS compulsive score; however, no correlation was found between the DEX score and the Y-BOCS obsessive score. A stronger correlation was observed between the Y-BOCS compulsive score and the 'inhibition' component of the DEX score, as defined by Burgess's 5-factor model. The DEX scores were correlated with cognitive test results measuring attention, cognitive flexibility and inhibitory processes. We conclude that obsessions indicate a failure of cognitive inhibition but do not involve significant impairment of executive functions, whereas compulsions indicate ineffective behavior inhibition and impaired executive functions.

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1. Introduction

Obsessions and compulsions are characteristic symptoms of Obsessive-Compulsive Disorder (OCD). Obsessions are intrusive, unwanted thoughts or images that patients are unable to ignore or block. Additionally, OCD patients tend to perform compulsions, which are perseverative behaviors or rituals that they are unable to interrupt or stop. Executive dysfunction is assumed to underlie both symptoms (Kuelz et al., 2004).

1.1. The dysexecutive syndrome and the Dysexecutive Questionnaire (DEX)

Adequate frontal lobe functioning is necessary for efficient executive functioning. According to Norman et al's. (2000) classification, executive functions are required in situations where routine activation of behavior would not be sufficient for optimal

performance. The significance of failure of inhibitory functions in dysexecutive syndrome was proposed by several research groups beginning in the early 1980s (Shimura, 1995; Burgess 1997). Prior research has revealed that dysexecutive symptoms can be identified not only in patients with brain injury, but also in those with psychiatric diseases like schizophrenia, depression and OCD (Evans et al., 1997; Tibbo and Warneke, 1999; Cavanagh et al., 2002).

Several validated cognitive tests and questionnaires are available to assess frontal lobe functioning, together with Behavioral Assessment of the Dysexecutive Syndrome (BADS) which is a cognitive test battery that includes the DEX questionnaire. The DEX is a standardized instrument to measure behavioral changes as a result of dysexecutive syndrome. The DEX measures dysexecutive symptoms at the behavioral level and is particularly designed to assess errors in goal-directed behaviors that occur during everyday life (Burgess et al., 1998). Several research groups have attempted to identify different factors of the DEX through factor analysis (Burgess et al., 1998; Chan, 2001; Amieva et al., 2003; Chaytor et al., 2006; Pedrero-Perez et al., 2009). Although researchers have identified different factors (or dimensions) of the DEX, one common factor can be identified in all dimensional

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Table 1
The different aspects of inhibition that are theorized in OCD.

Dysexecutive Questionnaire (DEX) (Burgess, 1997)	Chamberlain et al. (2005)	Chamberlain (2006)/Morein-Zamir et al. (2010)	White Bear Suppression Inventory (WBSI) (Wegner and Zanakos, 1994)	Wegner and Zanakos (1994) (Ironic process theory)
<ul style="list-style-type: none"> – The assessment of the dysexecutive symptoms in everyday goal-directed behaviors (behavior level) – Inhibition factor/dimension 	<ul style="list-style-type: none"> – Cognitive inhibition impairment (obsessions) – Behavior inhibition impairment (compulsions) 	<ul style="list-style-type: none"> – Motor inhibition impairment – Cognitive inflexibility (measured by neurocognitive tests) 	<ul style="list-style-type: none"> – Thought intrusions – Cognitive inhibition of unwanted thought: thought suppression 	<ul style="list-style-type: none"> – Operating inhibitory processes (conscious) – Monitoring processes (unconscious)

approaches, namely, the impairment of inhibitory functions. The BADS/DEX test battery proved to be valid not only in patients with brain injuries but also in patients with psychiatric diseases such as schizophrenia (Evans et al., 1997), schizotypal personality disorder (Laws et al., 2008), bipolar affective disorder (Cavanagh et al., 2002) and Asperger syndrome (Cederlund et al., 2010). To the best of our knowledge, however, the DEX questionnaire has not yet been used to study the dysexecutive symptoms in OCD.

1.2. The failures of cognitive and behavioral inhibitory processes in OCD

The failure of inhibitory processes has been theorized to occur in OCD by many researchers, although the term ‘inhibition’ has been used to signify various different features of distinct aspects of OCD (see Table 1). Chamberlain et al. (2005) emphasized the importance of failures of cognitive and behavioral inhibitory processes in OCD. These researchers identified two different failures of inhibitory processes in OCD, namely, a failure of cognitive inhibition that primarily relates to obsessive symptoms and a failure in behavior inhibition that is linked to compulsions. The authors hypothesize that these two failures in inhibitory processes are associated with distinct neural pathways and different cognitive dysfunctions. In a subsequent study, Chamberlain et al. (2006) specifically investigated the dysfunction of motor inhibitory control and cognitive flexibility, as this dysfunction has been theorized to be a central characteristic of OCD. Executive motor inhibition impairment can be measured by cognitive assessments, such as the Go/No-go Task, the Stroop Test and the Stop Signal Task. According to the psychometric analysis of Friedman and Miyake (2004), the Stroop test and the Stop Signal Task utilize the same component of the executive inhibitory control system, namely, prepotent response inhibition. The failure of executive cognitive flexibility is correlated with attentional set-shifting disturbance, which can be detected with assessments such as the Wisconsin Card Sorting Test (WCST), the Trial Making Test (TMT), or the Intradimensional/Extradimensional Shift Task (Kuelz et al., 2004; Chamberlain et al., 2006). Chamberlain et al. (2006) investigated motor inhibition using the Stop Signal Task and evaluated cognitive flexibility using the Intradimensional/Extradimensional Shift Task. Impairments in the intentional inhibition of simple motor actions have been demonstrated in OCD patients. Moreover, the impaired inhibition of simple motor responses has also been detected in unaffected first-degree relatives of OCD patients (Chamberlain et al., 2007), which has led to the proposal that response inhibition deficits may provide a useful intermediate marker of brain dysfunction, that is, that these deficits could represent an endophenotype for OCD. Recently, Morein-Zamir et al. (2010) used the Thought Stop Signal Task (TSST) to investigate whether the impaired stopping/suppression observed in

OCD patients could extend to the inhibition of ongoing thoughts as well.

1.3. Wegner's theory of cognitive inhibition of thoughts and thought suppression: the White Bear Suppression Inventory (WBSI)

The clinical presentation of OCD has driven researchers to investigate the integrity of controlled memory processes and executive functions in this disorder (Heuvel et al., 2005). Wegner et al. investigated memory inhibition processes using a paradigm in which thought suppression was required, i.e., by instructing participants, ‘Do not think of a white bear!’ (Wegner and Zanakos, 1994). Compared to those who had not used suppression, there was evidence for unwanted thoughts being immediately enhanced during suppression and, furthermore, for a higher frequency of target thoughts during the second stage, called rebound effect (Wegner, 1989). Thought suppression has paradoxical effects because it may cause the suppressed thought to be deeply activated and highly accessible (Wenzlaff and Wegner, 2000). Wegner and Zanakos (1994) theorized that two concurrent systems are triggered when an individual attempts to avoid a particular act or thought. One of these systems is a conscious operating process, which searches for mental content consistent with the intended state until this search is destabilized by distractions. This operating process requires conscious effort, as it is a controlled (non-automatic) process. The other system of Wegner's theory is an implicit monitoring process, which is unconscious and searches for mental content that is inconsistent with the intended state and the achievement of successful control. The operating process requires greater cognitive capacity than the monitoring process. When the operating process is voluntarily terminated, the monitoring process continues its vigilance for unwanted thoughts. This ‘online’ monitoring process increases the mind's sensitivity to unwanted material, a phenomenon that can explain the occurrence of post-suppression rebound and the ironic aspects of thought suppression (Wegner 1994, Wenzlaff and Wegner, 2000).

Wegner et al. (1987) concluded that certain individuals frequently use thought suppression as a coping mechanism. These investigators called this cognitive inhibition mechanism ‘chronic thought suppression’ and hypothesized that chronic thought suppression is of outstanding significance in OCD patients. To enable researchers to identify people who are more prone to suppressing thoughts in their daily lives, Wegner and Zanakos (1994) constructed a measure of chronic thought suppression, the White Bear Suppression Inventory (WBSI), which they validated by administering the WBSI to healthy subjects, patients with OCD and patients with depression. The WBSI scores correlated strongly with obsessive scores but were less strongly correlated with compulsive scores. Wegner and Zanakos (1994) thought, that

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