



## Set shifting and visuospatial organization deficits in body dysmorphic disorder



Jennifer L. Greenberg<sup>a,\*</sup>, Hilary Weingarden<sup>a</sup>, Lillian Reuman<sup>b</sup>, Dylan Abrams<sup>a</sup>, Suraj S. Mothi<sup>a</sup>, Sabine Wilhelm<sup>a</sup>

<sup>a</sup> Department of Psychiatry, Massachusetts General Hospital & Harvard Medical School, Simches Research Building 185 Cambridge Street, Suite 2000, Boston, MA 02114, USA

<sup>b</sup> Department of Psychology and Neuroscience, The University of North Carolina at Chapel Hill, Davie Hall, Campus Box 3270, Chapel Hill, 27599 NC, USA

### ARTICLE INFO

#### Keywords:

Visuospatial memory  
Rey-Osterrieth complex figure task  
Intra-Extra dimensional set shift task

### ABSTRACT

Individuals with body dysmorphic disorder (BDD) over-attend to perceived defect(s) in their physical appearance, often becoming “stuck” obsessing about perceived flaws and engaging in rituals to hide flaws. These symptoms suggest that individuals with BDD may experience deficits in underlying neurocognitive functions, such as set-shifting and visuospatial organization. These deficits have been implicated as risk and maintenance factors in disorders with similarities to BDD but have been minimally investigated in BDD. The present study examined differences in neurocognitive functions among BDD participants ( $n = 20$ ) compared to healthy controls (HCs;  $n = 20$ ). Participants completed neuropsychological assessments measuring set-shifting (Cambridge Neuropsychological Test Automated Battery Intra-Extra Dimensional Set Shift [IED] task) and visuospatial organization and memory (Rey-Osterrieth Complex Figure Test [ROCF]). Results revealed a set-shifting deficit among BDD participants compared to HCs on the IED. On the ROCF, BDD participants exhibited deficits in visuospatial organization compared to HCs, but they did not differ in visuospatial memory compared to HCs. Results did not change when accounting for depression severity. Findings highlight neurocognitive deficits as potential endophenotype markers of clinical features (i.e., delusionality). Understanding neuropsychological deficits may clarify similarities and differences between BDD and related disorders and may guide targets for BDD treatment.

### 1. Introduction

Body dysmorphic disorder (BDD) is a severe, common, and chronic psychiatric disorder. BDD is characterized by an extreme preoccupation with one or more imagined or exaggerated flaws in physical appearance, accompanied by repetitive, time-consuming rituals intended to hide or fix the perceived flaw (American Psychiatric Association APA, 2013). Given that BDD involves obsessional thinking and compulsive behaviors, BDD is classified as a member of the Obsessive-Compulsive and Related Disorders category in the Diagnostic and Statistical Manual – Fifth Edition (DSM-5) (APA, 2013). BDD also shares certain core similarities with anorexia nervosa (AN) (Hartmann et al., 2013), including disturbances of body image and the presence of delusional variants, in which distorted beliefs about one's appearance are strongly fixed (Mancuso et al., 2010; Konstantakopoulos et al., 2012).

Cognitive behavioral models of BDD emphasize the likely role of certain neurocognitive impairments in the development and

maintenance of BDD (Buhlmann and Wilhelm, 2004). For example, individuals with BDD often become “stuck” engaged in compulsions (e.g., spend hours examining a perceived flaw in the mirror), unable to disengage and shift attention (Fang and Wilhelm, 2015). This symptom may indicate underlying deficits in cognitive and attentional set-shifting, the ability to flexibly change focus in response to external, environmental demands (i.e., changing tasks) (Chamberlain et al., 2005; Fang and Wilhelm, 2015). Moreover, the presence of obsessional thinking patterns, in which individuals have difficulty disengaging from a preoccupation in order to re-focus on other cognitive content, may reflect deficits in cognitive and attentional set-shifting (Chamberlain et al., 2005). In fact, set-shifting deficits have been demonstrated in both OCD (e.g., Veale et al., 1996; Watkins et al., 2005) and AN (e.g., Roberts et al., 2007; Galimberti et al., 2013), suggesting that set shifting deficits may be a common underlying vulnerability factor across these related disorders. In addition to difficulty with set-shifting in BDD, the tendency to over-focus on minute visual details, rather than observing

\* Corresponding author.

E-mail addresses: [jlgreenberg@mgh.harvard.edu](mailto:jlgreenberg@mgh.harvard.edu) (J.L. Greenberg), [hilary\\_weingarden@mgh.harvard.edu](mailto:hilary_weingarden@mgh.harvard.edu) (H. Weingarden), [reuman@unc.edu](mailto:reuman@unc.edu) (L. Reuman), [dabrams3@mgh.harvard.edu](mailto:dabrams3@mgh.harvard.edu) (D. Abrams), [ssarvodemothi@mgh.harvard.edu](mailto:ssarvodemothi@mgh.harvard.edu) (S.S. Mothi), [swilhelm@mgh.harvard.edu](mailto:swilhelm@mgh.harvard.edu) (S. Wilhelm).

<https://doi.org/10.1016/j.psychres.2017.11.062>

Received 7 August 2017; Received in revised form 20 November 2017; Accepted 22 November 2017

Available online 24 November 2017

0165-1781/ © 2017 Elsevier B.V. All rights reserved.

the bigger visual picture (e.g., examining a perceived blemish on one's skin at very close proximity to the mirror, rather than taking in one's whole appearance when looking in the mirror) may reflect underlying deficits in visuospatial organization (Kerwin et al., 2014). Again, such neuropsychological deficits have been documented in near neighbor OCD (e.g., Savage et al., 1999; Penadés et al., 2005) and AN samples (e.g., Sherman et al., 2006; Lopez et al., 2008), suggesting that visuospatial organization may be important in the development, maintenance, and presentation of each of these related disorders.

While both cognitive-behavioral models of BDD and the literature on related disorders provide theoretical support for certain neurocognitive deficits in BDD, to date only a small number of studies have empirically examined these neurocognitive deficits in BDD. Two prior studies have examined set-shifting in BDD, using different neuropsychological tests. First, a study of individuals with BDD ( $n = 18$ ) and healthy controls (HCs) ( $n = 17$ ) used the Navon task to compare the speed at which participants detected a “target” shape, in trials that shifted from local-to-global or global-to-local visual stimuli (Kerwin et al., 2014). Participants with BDD were significantly slower than HC participants on set-shifting trials (Kerwin et al., 2014). The authors also found that severity of deficits in set shifting correlated with poorer insight, suggesting that deficits in set-shifting may underlie delusional fixity of obsessions (Kerwin et al., 2014). The authors did not examine whether severity of deficits in set-shifting correlated with BDD symptom severity, which also merits investigation. The second study used the Cambridge Neuropsychological Test Automated Battery (CANTAB) Intra/Extra Dimensional (IED) Set Shift Task to measure set-shifting in a small sample of individuals with BDD ( $n = 12$ ) compared to HCs ( $n = 16$ ) (Jeffries-Sewell et al., 2016). Findings again demonstrated significant deficits in set-shifting in the BDD sample compared to the HC sample, marked by a greater number of errors (Jeffries-Sewell et al., 2016). However, conclusions from this study are limited by its small BDD sample, which had subclinical to mild BDD symptom severity. Moreover, 75% of the BDD sample had comorbid OCD, which confounds the ability to distinguish whether deficits in set-shifting are explained by features of BDD, OCD, or common features. Altogether, while there is reason to believe that set-shifting deficits are implicated in BDD, the evidence to date is scarce and has important limitations, thus requiring replication and extension.

Several studies have also examined visuospatial memory and organization in BDD, yielding mixed results. Hanes (1998) used the Rey-Osterrieth Complex Figure Test (ROCF) to compare visuospatial memory among participants with BDD ( $n = 14$ ), OCD ( $n = 10$ ), and HCs ( $n = 24$ ), finding no differences in memory performance across these three groups. Moreover, Dunai and colleagues (2010) utilized tasks from the CANTAB to compare visuospatial memory, specifically, in individuals with BDD ( $n = 14$ ) and HCs ( $n = 14$ ), also failing to find significant differences between groups. On the other hand, Deckersbach et al. (2000) again utilized the ROCF to investigate differences in visuospatial memory and organization between participants with BDD ( $n = 17$ ) and HCs ( $n = 17$ ). Participants with BDD had poorer memory scores (i.e., they were significantly less accurate in recalling the complex figure compared to HCs), and they had significantly poorer organizational scores on the copy trial compared to HCs (Deckersbach et al., 2000). However, group differences in visuospatial memory were mediated by deficits in organizational strategy (Deckersbach et al., 2000), suggesting that organizational deficits may underlie poor memory performance in this sample. Evidence of visuospatial organization deficits highlights the potential role of over-focusing on details in exchange for observing the larger visual pattern of the complex figure. To this end, one recent study investigated global and local visual processing in participants with BDD ( $n = 18$ ) and HCs ( $n = 17$ ) on the embedded figures task, finding that BDD participants had slower reaction times and lower accuracy scores compared to HCs (Kerwin et al., 2014). The authors suggest that these findings provide further evidence for deficits in visuospatial processing in those with BDD. As with set-

shifting deficits, the authors also found that performance on this task was significantly associated with delusional fixity (Kerwin et al., 2014). Taken together, evidence for visuospatial memory and organization deficits in BDD is mixed. Existing BDD research does not provide strong support for deficits in visuospatial memory. On the other hand, two prior studies have found evidence of visuospatial organization deficits in BDD. Further research is warranted in order to draw conclusions.

The overarching aim of the present study was to replicate and extend neurocognitive research on BDD. Specifically, in a sample of 20 participants with BDD and 20 HC participants, we examined group differences in set-shifting on the CANTAB IED (Aim 1) and group differences in visuospatial memory and organization on the ROCF (Aim 2). Building from prior research in BDD and related disorders, we hypothesized that those in the BDD group would make more errors on the IED task compared to HC participants. We also hypothesized that those in the BDD condition would demonstrate poorer visuospatial organization across trials of the ROCF compared to HC participants. On the other hand, we did not expect to find significant group differences in visuospatial memory (i.e., accuracy scores) across trials of the ROCF. To build on existing research that has demonstrated a relationship between delusional fixity and certain neurocognitive deficits (Kerwin et al., 2014), we were also interested in whether performance on the IED and ROCF was associated with specific clinical features of BDD (i.e., delusional fixity, severity of BDD symptoms) (Aim 3). Identifying relationships between neurocognitive performance and BDD symptoms may elucidate neurocognitive endophenotypes that underlie specific clinical phenotypes. Drawing from the limited existing research studying the relationship between delusional fixity and certain neurocognitive deficits, we hypothesized that severity of delusional fixity and BDD symptoms would be associated with poorer task performance. Finally, as an exploratory aim, we examined whether severity of depressive symptoms better accounted for group differences on the IED or ROCF (Aim 4), hypothesizing that group differences would remain significant even when accounting for depression as a covariate in analyses. Neurocognitive research has the potential to elucidate etiological and maintaining factors of BDD, explain potential neurocognitive underpinnings of certain BDD symptoms, clarify underlying similarities and differences between BDD and related disorders (e.g., OCD, AN), and highlight potential targets for treatment.

## 2. Methods

### 2.1. Subjects

BDD ( $n = 20$ )<sup>1</sup> and HC ( $n = 20$ ) participants were recruited for a broader study of eye tracking and attention biases in BDD (Greenberg et al., 2014) between March 2011 and June 2012. Participants were recruited through ongoing clinic studies and advertisements posted in the community and online. BDD participants were included if (1) they met criteria for primary BDD based on the Diagnostic and Statistical Manual of Mental Disorders – Fourth Edition (DSM-IV TR; American Psychiatric Association APA, 2000); (2) scored  $\geq 20$  on the Yale-Brown Obsessive Compulsive Scale Modified for BDD (BDD-YBOCS; Phillips et al., 1997); (3) were 18 or older; (4) were fluent in English; and (5) had primary appearance concerns focused on one's face or head. Face and head concerns were required for participation in the primary study (Greenberg et al., 2014). BDD participants with comorbid bipolar disorder (current manic episode), current substance dependence, current suicidality, organic mental disorder, developmental disorder or a lifetime psychotic disorder were excluded. HC participants were excluded if they had a lifetime psychiatric illness. To minimize potential confounding by age and gender, we recruited HC participants that matched

<sup>1</sup> One participant with BDD in the current study was not included in the primary paper (Greenberg et al., 2014), due to invalid eye tracking data.

متن کامل مقاله

دریافت فوری ←

**ISI**Articles

مرجع مقالات تخصصی ایران

- ✓ امکان دانلود نسخه تمام متن مقالات انگلیسی
- ✓ امکان دانلود نسخه ترجمه شده مقالات
- ✓ پذیرش سفارش ترجمه تخصصی
- ✓ امکان جستجو در آرشیو جامعی از صدها موضوع و هزاران مقاله
- ✓ امکان دانلود رایگان ۲ صفحه اول هر مقاله
- ✓ امکان پرداخت اینترنتی با کلیه کارت های عضو شتاب
- ✓ دانلود فوری مقاله پس از پرداخت آنلاین
- ✓ پشتیبانی کامل خرید با بهره مندی از سیستم هوشمند رهگیری سفارشات