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Imagery Rescripting for Body Dysmorphic Disorder: A Multiple-Baseline Single-Case Experimental Design

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Individuals with body dysmorphic disorder (BDD) often experience negative distorted images of their appearance, and research suggests these may be linked to memories of adverse events such as bullying or teasing. This study evaluates imagery rescripting (ImR) as an intervention for BDD. In this article, we present a multiple-baseline single-case experimental design testing imagery rescripting as a brief, stand-alone intervention, with six individuals with BDD that related to aversive memories. The impact of the intervention was assessed by self-reported daily measures of symptom severity (preoccupation with appearance, appearance-related checking behaviors, appearance-related distress, and strength of belief that their main problem is their appearance) and standardized clinician ratings of BDD severity (Yale–Brown Obsessive Compulsive Scale modified for BDD). Four out of six of the participants responded positively to the intervention, with clinically meaningful improvement in symptomatology. Overall response was rapid; improvements began within the first week post-ImR intervention. From a small sample it is cautiously concluded that imagery rescripting may show promise as a module in cognitive-behavioral therapy for BDD, and is worthy of further investigation.

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INDIVIDUALS WITH BODY DYSMORPHIC disorder (BDD) are preoccupied with a perceived defect or flaw in their physical appearance that is not observable to others or appears only slight. To fulfill the diagnostic criteria, they must also experience clinically significant distress or impairment in social, occupational, or other important areas of functioning (American Psychiatric Association, 2013). The prevalence of BDD is reported to be up to 2.4% in the U.S. population (Koran, Abujaoude, Large, & Serpe, 2008). BDD is a chronic condition that usually develops during adolescence (Veale, Boocock, et al., 1996) and has significant negative impact on quality of life (Phillips, 2000). Suicide rates in individuals with BDD are high, with as many as 80% reporting lifetime suicidal ideation and up to 28% attempting suicide (Phillips et al., 2006; Veale, Boocock, et al., 1996).

Cognitive-behavioral therapy (CBT) for BDD has traditionally focused on cognitive restructuring and exposure and response prevention or behavioral experiments (Veale & Neziroglu, 2010; Wilhelm, Phillips, & Steketee, 2013). There are only four randomized controlled trials (RCTs) testing CBT versus a wait-list as a treatment for people with BDD (Rabiei, Mulkens, Kalantari, Molavi, & Bahrami, 2012; Rosen, Reiter, & Orosan, 1995; Veale, Gournay, et al., 1996; Wilhelm et al., 2014). All studies reported a significant reduction in symptoms associated with BDD compared with the wait-list.

Last, Veale et al. (2014) have shown CBT to be superior to anxiety management for BDD. In clinical practice, individuals with BDD are frequently regarded as difficult to treat, and a significant number fail to respond or to make a full recovery.

A distorted body image and excessive self-focused attention are central features of a model of "the self as an aesthetic object," which is characteristic of people with BDD (Veale, 2004; Veale, Boocock, et al., 1996). Evidence for the experience of distorted imagery in BDD comes from a descriptive study that compared 18 participants with BDD with 18 healthy controls using a semi-structured interview and questionnaires (Osman, Cooper, Hackmann, & Veale, 2004). The BDD and control groups were equally likely to experience spontaneous images of their appearance. However, people with BDD were found to have appearance-related images that were significantly more negative, more recurrent, and viewed more from an observer perspective (seeing themselves in their mind's eye from another person's viewpoint) than were those of the control participants. These images were more vivid, detailed, and distorted, and typically involved bodily sensations. The content of the images was frequently related to early aversive memories from childhood or adolescence. The most common memories were of bullying or teasing.

These findings were confirmed by Buhlmann, Cook, Fama, and Wilhelm (2007) and Buhlmann et al. (2011), who also found that people with BDD reported memories of more appearance and competency-related teasing than did mentally healthy control participants. Kosslyn, Ganis, and Thompson (2001) note that while mental images often take a visual form, they may include other sensory modalities as well, such as the auditory, olfactory, or kinesthetic. People with BDD are frequently comparing or scrutinizing their area of concern within their mind's eye, and imagining how their feature appears to others (Veale, 2004).

The prevalence of imagery linked to aversive experiences in BDD could indicate that imagery-based techniques might be worthy of investigation. Imagery rescripting (ImR) has received increasing interest as an intervention for people who experience distressing images (Holmes, Arntz, & Smucker, 2007). ImR was originally developed for posttraumatic stress disorder (PTSD; Smucker & Dancu, 1999) and personality disorder (Arntz & Weertman, 1999) and involves techniques that transform distressing mental images into more benign entities or construct new positive images. Holmes et al. (2007) demonstrated that imagery has greater power to affect emotion than verbal processing, and that emotional memories are far more likely to be represented as images than as verbal thoughts. ImR was not typically used as a stand-alone intervention in the four RCTs for CBT for BDD (Rabiei et al., 2012; Rosen et al., 1995; Veale, Gournay, et al., 1996; Wilhelm et al., 2014), but was used as an optional module in a treatment protocol for one RCT (Veale et al., 2014). Thus it would be helpful to determine if a module using ImR has any efficacy for people with BDD who report images and so would strengthen the rationale for its inclusion in CBT packages. The evidence to date for ImR in other disorders has been dominated by case studies and pilot RCTs with small sample sizes. For example, Nilsson, Lundh, and Viborg (2012) conducted a small RCT (n = 14) comparing ImR with a reading task in participants with social phobia. They found a significant reduction in symptoms of social phobia across a number of measures. ImR has demonstrated some efficacy, mainly in people suffering from a range of conditions such as social phobia (Nilsson et al., 2012; Wild & Clark, 2011; Wild, Hackmann, & Clark, 2008), PTSD (Hackmann, 2011), depression (Wheatley & Hackmann, 2011), personality disorder (Arntz & Weertman, 1999), simple phobia (Hunt & Fenton, 2007), and obsessive–compulsive disorder (OCD; Veale, Page, Woodward, & Salkovskis, 2015).

In a recent review of the ImR literature, Arntz (2012) concluded that the results are encouraging in terms of efficacy of the technique, but that the RCTs or case series that have been carried out have been underpowered or with inadequate control conditions. There may be a number of possible mechanisms that account for the effects of ImR. They typically focus on imagining that an aversive memory has changed so that the outcome is more desirable, or at least less aversive (Arntz, 2012)—for example, through emotional processing, changing memory representation, counterconditioning (such as adding a soothing image), changing the meaning of the imagery, and changing the sense of "nowness" or context of the imagery. However, these putative mechanisms have not been fully investigated.

Because people with BDD have a distorted body image and share a number of features with OCD and social phobia (Coles et al., 2006; Wilhelm & Neziroglu, 2002), interventions that have been of benefit for OCD and social phobia are of particular interest to those trying to help people with BDD. ImR has not previously been evaluated for BDD but it seems to be a logical choice given the central nature of imagery in BDD and the frequent emotional links to aversive early memories. It also offers the opportunity to develop an alternative understanding and context for their body image, while avoiding verbal debate about whether the person has a perceived or "real" defect, or whether

it means he or she will be rejected, which is considered ineffective in BDD (Neziroglu & Khemlani-Patel, 2002).

The aim was therefore to conduct a proof-of-concept study investigating ImR in BDD using a multiple-baseline single-case experimental design (SCED). This method of investigation places emphasis on observing change in the individual. It is the frequency of the measurement that enables both the presence and degree of change and the pattern of change to be observed. The multiple-baseline design replication, another key characteristic of SCED, and the staggered baselines allow greater control over potential maturation and history effects and the impact of extraneous coexisting events to enable ImR-related improvements to be identified (Hayes, 1981). The advantage of a stand-alone intervention is that it helps to "unbundle" complex interventions like CBT and determine whether a given intervention is worthy of inclusion as a treatment module. We chose to build on the results of previous studies that have investigated ImR in the treatment of a range of disorders. We enhanced the experimental strength of the study by using a randomization-to-baseline length, adding a control intervention, ensuring long-term follow-up, and avoiding any other intervention after the ImR. Our hypotheses were that the ImR intervention phase would result in significant improvements in the participants' preoccupation with their appearance and degree of distress. Our secondary aims were to examine whether the ImR intervention phase decreases the frequency of checking, enhances participants' engagement in a psychological understanding of their condition, and is associated with clinically significant improvement in symptoms of BDD and depression at the 6-month follow-up.

Method

DESIGN

The present study employed an adapted multiple-baseline ABC SCED with randomization to intervention point (i.e., where A is baseline before intervention, B is the single-session control intervention followed by 2 weeks of symptom monitoring, and C is the single-session ImR intervention followed by further symptom-monitoring phase). The first author (R.W.), using a random number generator to allocate participants to different baseline lengths, conducted randomization. The baseline lengths were 7, 14, 21, and 28 days.

PARTICIPANTS

We invited six consecutive participants who experienced imagery with memories that appeared linked to their concerns about their appearance to take part in the study following routine assessment in private practice. No other participants were recruited. No charge and no compensation was made for participation. All were offered six further sessions following completion of the follow-up period. All participants completed the study. None had previously been given ImR. In addition, they fulfilled the following inclusion criteria: (a) diagnosis of BDD with the Structured Clinical Interview for DSM-IV Disorders (SCID; First, Spitzer, Gibbon, & Williams, 1995), (b) no change to any current pharmacological treatment and no plans to start pharmacological treatment in the 4 weeks prior to entering the study, (c) a total score of 20 or more on the Yale–Brown Obsessive Compulsive Scale modified for BDD (BDD-YBOCS; Phillips et al., 1997), and (d) ages 18 years or over. The following exclusion criteria were used: (a) comorbidity of psychosis or borderline personality disorder (a diagnosis of delusional disorder relating to appearance was not grounds for exclusion), (b) current alcohol or substance dependence, and (c) concurrent additional psychotherapy.

CLINICAL DETAILS

Participant A was a 23-year-old female student, who had had BDD for 8 years. She had comorbid diagnosis of depression. She reported two previous trials of CBT for BDD, the last occurring 17 months previously, with little if any reported improvement in her symptoms. Her main areas of concern were her skin being "marked" and scarred, eyes the wrong shape, and hair too thin, with which she was preoccupied for at least 8 hours of the day. Participant A was not taking any medication.

Participant B was a 21-year-old male with BDD of approximately 7 years' duration. His problem was triggered when he developed mild acne, and became afraid that he would lose his reputation for being good-looking and "cute." He would spend at least 3 hours a day researching dermatological treatments to ensure that his skin did not "flare up," but his main coping strategy had become avoidance of social situations. He did not feel that he would avoid social situations if his appearance was improved. Participant B was not taking any psychiatric medication and had not had previous CBT.

Participant C was a 27-year-old male preoccupied with a fear of losing his hair. He had comorbid depression. He reported two previous trials of CBT: one of six sessions of exposure and response prevention, and one of eight sessions of mindfulness-based CBT, and reported that they had yielded limited benefit. He spent many hours researching nutrition, hormones, and shampoo products related to hair loss on the Internet. He would have "debates" almost

every day with his parents about how much hair he was losing and what the best strategy for prevention of further hair loss might be. Participant C had been taking high-dose selective serotonin reuptake inhibitor (SSRI)-type antidepressants for the past 3 years and was taking 60 mg fluoxetine daily.

Participant D was a 19-year-old female student, whose main concerns were the size of her breasts, the shape of her thighs, and the skin on her face. She would spend around 4 hours each day researching cosmetic and dermatological treatments. She had attended 18 sessions of CBT, completed 8 months previously, which had focused on social anxiety and low self-esteem, and had achieved a modest improvement according to the participant. Participant D was not taking any medication, although she had had a brief trial of citalopram 20 mg a year earlier.

Participant E was a 29-year-old female shop assistant suffering from preoccupation with bags under her eyes, which she felt that she had caused through smoking cigarettes and staying up late as a teenager. She completely avoided all mirrors and reflective surfaces, and would become extremely distressed if she did accidentally see her face in a reflective surface. Consequently, her range of activities was greatly narrowed, as it was restricted to areas where she knew the location of all reflective surfaces. She had not accepted medication and had undergone some integrative psychotherapy 3 year earlier, with no effect on her BDD symptoms.

Participant F was a 35-year-old female, preoccupied with the size and shape of her nose, and the fact that it no longer "matched" her eyes following a rhinoplasty. She would take great care to avoid reflective surfaces for most of the day, but would at times become "stuck" examining her face. She would spend several hours a day ruminating on her regret—"if only" she had chosen not to have the surgery—and wishing that other people had dissuaded her from it. She had a comorbid diagnosis of depression, and was taking fluoxetine 20 mg. She had had no previous trials of SSRI or CBT.

The study received ethical approval from the NRES Committee London—Bentham.

MEASURES

The primary outcome measure was the daily self-monitoring of the degree of BDD-related preoccupation and the level of distress experienced. These two measures were selected for analysis and report in this paper as they are core defining criteria of BDD (American Psychiatric Association, 2000). The daily record sheet asked participants to monitor the degree of preoccupation experienced on that day, on a scale from 0 (*not at all*) to 100 (*totally preoccupied; on my mind all day*). The level of distress was assessed in the same manner, from 0 (*not distressed at all*) to 100 (*completely distressed*). The daily frequency of appearance-related checking behavior was also recorded.

A single item included on the daily record sheet assessed the degree to which participants accepted a psychological model of their problem. Participants were asked to mark on a visual analogue scale (VAS) from 0 ("My main problem is the way I look") to 100 ("My main problem is one of worrying excessively about the way I look"). This was completed daily up until the end of the final baseline period. The intensity of other BDD symptoms (e.g., *degree to which I rate my appearance as ugly*) was also recorded but is not included in this report for reasons of space. Participants completed this daily self-monitoring until the end of the 6-month observation period.

Standardized Measures of Symptom Severity

In this study, standardized measures of symptom severity were not the primary outcome measure as single-case designs require frequent (usually daily) measures. However, they provided a context for the interpretation of any improvements recorded by the daily measures and were administered at the initial assessment, end-of-baseline phase, postcontrol intervention, post-ImR intervention, and at 3- and 6-month follow-ups.

The BDD-YBOCS (Phillips et al., 1997) was used to rate the severity of BDD during the previous week. It is an observer-rated tool containing 12 items assessing BDD symptoms. Each item is rated from 0 (*no symptoms*) to 4 (*extreme symptoms*). The range is 0–48 where a higher score indicates greater severity. The accepted cutoff for presence of BDD is >20 (Phillips, Hart, & Menard, 2014). It has been widely used in RCTs to test efficacy of treatment and has high internal reliability (α = 0.92; Phillips et al., 2014).

The Beck Depression Inventory (BDI; Beck & Steer, 1984; Beck, Steer, & Garbin, 1988) is a self-report measure designed to assess depressive symptomatology experienced over the previous 2 weeks. It consists of 21 groups of statements and asks the respondent to select the one that best describes how he or she has been feeling. Internal consistency of the BDI ranges from .86 to .88 in psychiatric populations, with a clinical mean score ranging from 19.28 (*SD* = 10.87) to 23.16 (*SD* = 9.55). Cutoff scores for the BDI are <10 = minimal; 10–18 = mild to moderate; 19–29 = moderate to severe; and 30–63 = severe.

INTERVENTIONS

Participants were informed that the investigation was to determine whether talking or imagining bad

experiences in the past had any benefit on the symptoms of BDD. In the first phase they were asked to describe the imagery and memories out loud, with the rationale to see what happens if the therapist and participant can understand the event better. In the second phase the rationale was to see what happens if they can imagine changing the events in a way that helps them to feel better in the image. The ImR intervention originates from Arntz and Weertman (1999) in which participants revisit their memory of traumatic childhood images in three stages: (a) the participant relives the image as a child and the child describes his or her needs; (b) the participant enters the image as an adult, to provide the child's needs and provide a different perspective; and (c) the participant then returns to the image as a child, with the adult self in the room to determine whether the child has any further needs. As described by Wild and Clark (2011), Arntz and Weertman's (1999) procedure was adapted for this study by incorporating cognitive restructuring of the meaning related to the image.

ImR Step 1 by Identification of a Recent Trigger

The starting point for the ImR intervention is a recent moment in which the individual experienced distress about the perceived appearance defect. Either the bodily location of distress ("felt sense") or the negative meaning can be used as a "bridge" to the earliest memory of thinking or feeling that way and identifying the associated memory.

ImR Step 2 by Contextualization and Cognitive Restructuring

During Step 2, the therapist and client work together to challenge the meaning of the early event and its implications for the present. For example, if a client's memory is of being bullied and interpreted the event as meaning "I'm ugly and disgusting; people will reject me or laugh at me if I reveal my flaws," he or she would be encouraged to have the younger self identify his or her needs and have the wise adult come up with alternative ways of viewing the event with a compassionate perspective. In essence, the therapist helps the client to distinguish between what happened when he or she was a young child/teenager and what happens now as an adult in order to help him or her to see the event as an exceptional, time-limited experience, without implications for the present or future. The participant would then incorporate what the younger self needs and the new meaning into the next rescripting phase.

ImR Step 3 by Rescripting

During the rescripting step, participants are asked to imagine entering the scenario identified in Step 1 to "rescript" and change events in the memory so as to provide the younger self with what he or she needs in order to feel better. Participants are encouraged to convey to the younger self the alternative perspective they have come up with in the cognitive restructuring phase, and if they are able, to offer some physical comfort such as a hug. Finally, they relive the event from the perspective of their younger self with their adult self in the room with them. This time the younger self is also asked if there is anything else that the younger self needs in order to feel safer or has doubts about, and Step 2 may be repeated to incorporate this material.

PROCEDURE

The diagnosis of BDD was made independently prior to referral to the study. Following a baseline Phase A (7, 14, 21, or 28 days), participants received a control intervention (B) in which they were asked to simply describe the imagery and memories out loud, but with no other intervention in a single stand-alone therapeutic session of 50 minutes' duration. After a period of symptom monitoring (14 days) they received ImR in another single stand-alone therapeutic session of 90 minutes (C) followed by a further symptom-monitoring phase of 7 days. Follow-up sessions were conducted after 3 and 6 months. Participants received no additional therapy before completion of the 6-month follow-up. The first author (R.W.) conducted the clinical assessments.

DATA ANALYSIS

The data were first graphed according to standard presentation in SCED and then assessed in terms of an experimental criterion (Did the ImR have an effect?) and a therapeutic criterion (Was the effect clinically significant?; Kazdin, 1998). This was achieved by using visual analysis (VA) of the graphs. Whereas VA is considered to be a relatively insensitive approach, especially when there is a great deal of day-to-day variability, it is this characteristic that makes it useful for identifying potent interventions and more likely to give clinically relevant results (Kazdin, 1998). The data were plotted using Excel and subjected to VA according to guidelines proposed by Kazdin (1998). This involves assessing certain characteristics of the graphs within and between each phase: (a) change in the trend or level of the symptom severity across phases, (b) the degree of the slope of the graph reflecting the strength of the trend change, and (c) change in the variability of the data indicating stability of symptom change. For statistical analysis we used "Tau-U" (Parker, Vannest, Davis, & Sauber, 2011), a test designed specifically for single-case research. Tau-U is a combination of Mann–Whitney

U (between groups) and Kendall Tau (correlation) and can test for data nonoverlap between phases. It is a distribution assumption-free test and considers all the data points, not only summary statistics (i.e., mean or median). It reflects the proportion of data that are different (or nonoverlapping) from the comparison phase. The Tau-U statistic can be understood as the percentage of data that "improves" over time across the phases (baseline vs. control, control vs. ImR), and also takes into consideration any baseline trend (i.e., the direction a person's symptoms were taking prior to intervention). In addition to individual Tau statistics, a combined effect size across all the cases for each outcome variable was calculated. This is the "weighted average" in which "weight" is the inverse of the variance of the test statistic (http://www.singlecaseresearch.org/calculators/tau-u). The weighted average reflects the proportion of data that is nonoverlapping between phases across all cases (see Parker et al., 2011, for further details on Tau-U).

Standardized Measures

The BDD-YBOCS scale was used to identify the number of participants who displayed (a) reliable change and (b) clinically significant change (Jacobson & Truax, 1991) from baseline to 6-month follow-up after an intervention. To achieve reliable change, the magnitude of change needs to be greater than the standard error of measurement of the difference (Reliable Change Index). We used the test–retest reliability of 0.93 (Phillips et al., 2014). We used Criterion A to determine clinically significant change on the BDD-YBOCS. This is pre- to postchange of at least two standard deviations from the original mean preintervention to postintervention. Criteria B and C were not used because no normative data were available for the nonclinical population. We used an Excel spread sheet: the Leeds Reliable Change Indicator (Morely & Dowzer, 2014). To determine Criterion A, the clinical norm data (mean = 35.42, *SD* = 6.61) was taken from a recent RCT for BDD (Veale et al., 2014). In addition, we recorded the participants who achieved a 30% or greater decrease in the total BDD-YBOCS, which best corresponded to "much improved" on the Clinical Global Impression (CGI) Scale (Guy, 1976). We used Criterion C to determine significant change for the BDI in which we used a clinical mean of 23.16 (*SD* = 9.55) from a clinical sample (Beck & Steer, 1984) and 7.28 (*SD* = 6.28) in a normative sample with a test–retest reliability of 0.90 (Lightfoot & Oliver, 1985).

Results

Daily self-monitoring for preoccupation with appearance and distress are displayed in Figures 1 and 2. All six participants showed very little variability at baseline, suggesting that levels of preoccupation were relatively stable. Postcontrol intervention there was little change in the degree of preoccupation with appearance for Cases A, B, E, and F. Cases C and D show an increase in preoccupation immediately followed by reduction. Following ImR, Participants A, D, E, and F showed significant reduction in preoccupation relative to postcontrol phases. For these participants there is a clear downward trend and/or a reduction in level, with pronounced change in slope indicating a swift and strong change in trend; the resulting change in level is maintained up to 3 months post-ImR. It is of note that Participant F shows a more stepped reduction after ImR, and the strongest level of inference that the treatment had an effect can be drawn from VA of this participant's results. Participants B and C showed little reduction in preoccupation post-ImR. As shown in Tables 1 and 2, there was no significant difference between baseline and the postcontrol symptom-monitoring phase for all participants except Participant C. Participants A, D, E, and F showed a statistically significant change in level of nonoverlapping data between the postcontrol and the post-ImR phases at $p < .01$.

Visual inspection of the graph (Figure 2) indicated that Participants A–E showed very little variability at baseline, suggesting that levels of distress were relatively stable prior to intervention. Participant F showed fluctuation during baseline, which was controlled for in the Tau analysis. Participants B and E showed little change in trend during the postcontrol symptom-monitoring phase. Participants D, C, and F reported fluctuation in distress during the postcontrol symptom-monitoring phase, with participants A and F showing a clear reduction in distress. Following ImR, participants A, D, and E showed significant decrease: however, Participant F showed greater fluctuation. Participant F had a reversal in slope suggesting that relative to trend, her level of distress was worsening, possibly due to an increased level of uncertainty as beliefs were challenged. For Participants A and D, the slope was pronounced, indicating a strong and immediate response to the intervention. Participant B showed no change across all phases. As shown in Tables 3 and 4, Tau analysis indicated that Participants A and F showed a significant reduction in distress between baseline and postcontrol phase. All participants, excluding Participant B, reported a statistically significant reduction in distress post-ImR compared with the period postcontrol intervention.

APPEARANCE-RELATED CHECKING BEHAVIORS

All six participants showed some fluctuation in checking behaviors during the baseline period, but

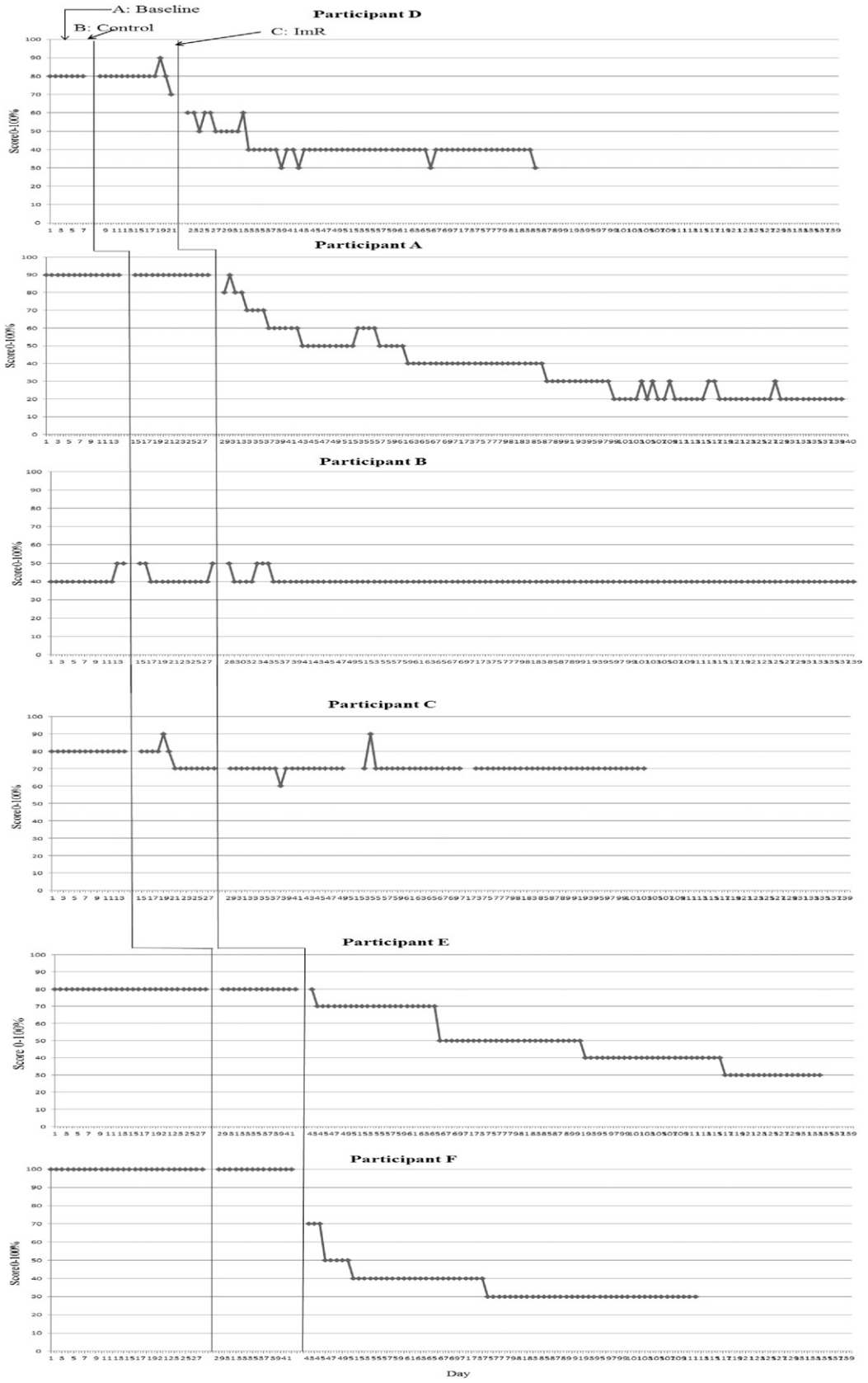

FIGURE 1 Degree of preoccupation with appearance over time (days) for cases A–F.

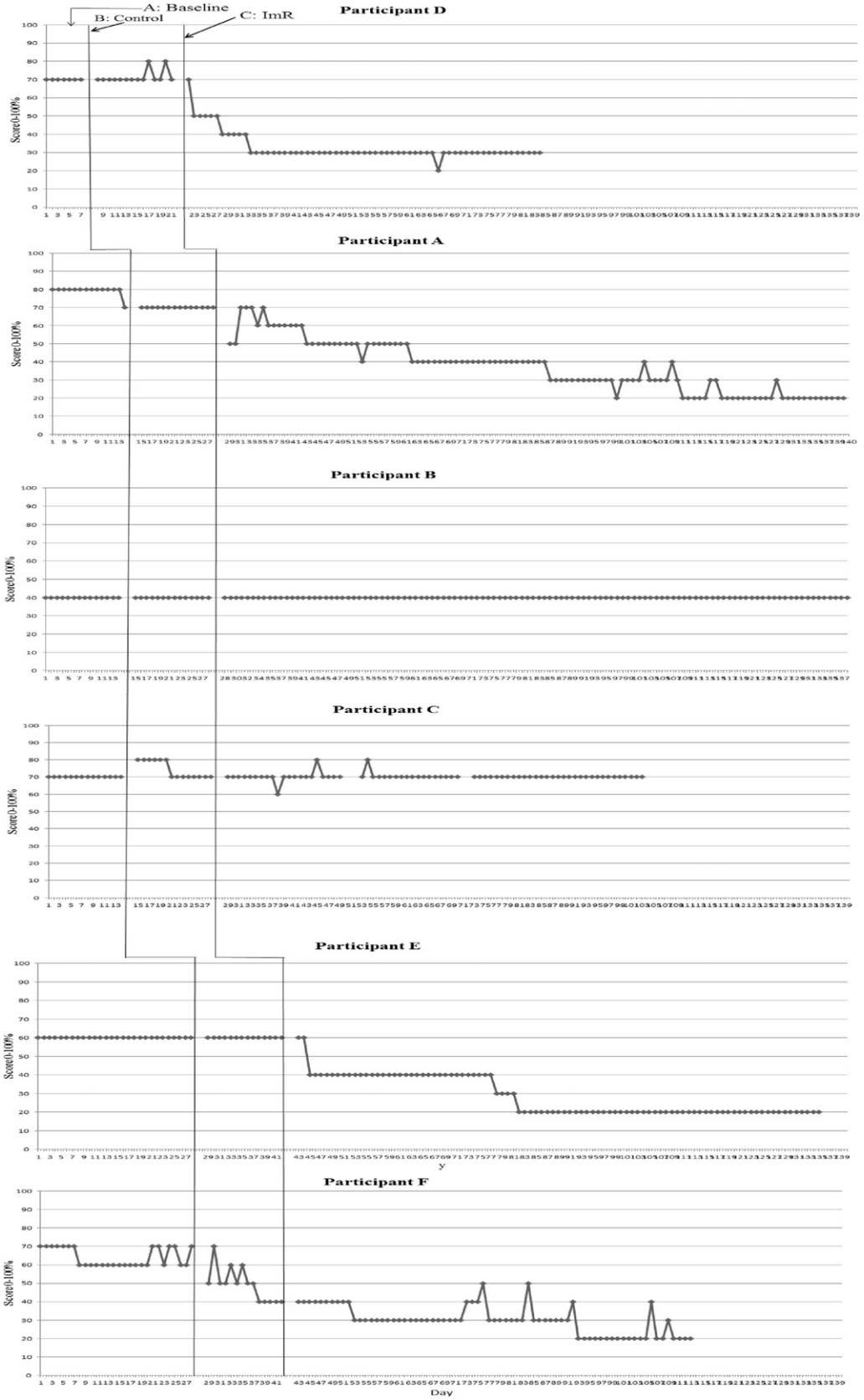

FIGURE 2 Level of distress ratings over time (days) for cases A–F.

Table 1
Summary of Tau Analysis Comparing Baseline Phase (A) With Postcontrol Intervention Phase (B) Across Daily Measures of Preoccupation With Appearance

Case	Tau	*SD* Tau	*p* value	90% CI
A	0.000	0.222	1.000	[−0.365, 0.365]
B	0.071	0.222	0.748	[−0.294, 0.437]
C	−0.500	0.222	0.024*	[−0.865, −0.135]
D	0.000	0.274	1.000	[−0.450, 0.450]
E	0.000	0.191	1.000	[−0.315, 0.315]
F	0.000	0.191	1.000	[−0.315, 0.315]
Weighted average	−0.070		0.441	95% CI [−0.248, 0.108]

Note. SD = standard deviation; CI = confidence interval.
*$p < .05$, **$p < .01$.

Table 3
Summary of Tau Analysis Comparing Baseline Phase (A) With Postcontrol Intervention Phase (B) Across Daily Measures of Distress

Case	Tau	*SD* Tau	*p* value	90% CI
A	−0.929	0.222	0.000**	[−1.294, −0.563]
B	0.000	0.222	1.000	[−0.320, 0.320]
C	0.429	0.222	0.054	[0.063, 0.794]
D	0.143	0.274	0.602	[−0.307, 0.593]
E	0.000	0.191	1.000	[−0.315, 0.315]
F	−0.806	0.191	0.000**	[−1.121, −0.492]
Weighted average	−0.215		0.018*	95%CI [−0.393, −0.038]

Note. SD = standard deviation; CI = confidence interval.
*$p < .05$, **$p < .01$.

the level remained similar between baseline and the postcontrol symptom-monitoring phase (see Supplementary Figure 3). Post-ImR, Participants D, E, and F showed a pronounced change in slope, indicating a significant reduction in checking behavior. However, the change in level for Participant E was notably delayed. Checking does fluctuate from day to day but the trend showed a consistent decline in checking behavior. Participant A showed a gradual reduction in checking behavior. Participants B and C showed little change in checking behavior across the phases. As displayed in Supplementary Tables 1 and 2, Participants A, D, E, and F showed significant change in checking behavior post-ImR phase ($p < .001$) with no difference between baseline and the postcontrol phase.

ENGAGEMENT IN A PSYCHOLOGICAL UNDERSTANDING OF THEIR CONDITION

All participants showed very little spontaneous change in engagement in a psychological understanding of their appearance concerns during the baseline phase (see Supplementary Figure 4). Following the control intervention, Participants A, B, C, and E showed a reduction, with modest slope, in the belief that their main problem was their actual physical appearance (as opposed to a psychological explanation such as that the problem was *preoccupation* with their appearance). Conversely, Participant F showed an increase in the strength of her "problem is appearance" belief, with a stepped change. Following ImR, Participants A, D, E, and F showed a significantly steeper reduction in the idea that their main problem was their appearance, relative to the postcontrol phase. Participants B and C showed no significant reduction. Again, it is of note that Participant F showed a more stepped reduction after ImR.

As shown in Supplementary Tables 3 and 4, Tau analysis indicated that all participants apart from Participant D showed a statistically significant reduction in their strength of belief in a nonpsychological explanation ($p < .01$). Following the ImR intervention, Participants A, D, E, and F showed further reduction in this nonpsychological understanding of their condition ($p < .01$).

Table 2
Summary of Tau Analysis Comparing Postcontrol Phase (B) With Post-ImR Intervention Phase (C) Across Daily Measures of Preoccupation With Appearance

Case	Tau	*SD* Tau	*p* value	90% CI
A	−0.991	0.164	0.000**	[−1.261, −0.721]
B	−0.179	0.164	0.276*	[−0.449, 0.091]
C	−0.371	0.170	0.029	[−0.651, −0.092]
D	−1.000	0.171	0.000**	[−1.282, −0.718]
E	−0.989	0.166	0.000**	[−1.263, −0.715]
F	−1.000	0.170	0.000**	[−1.280, −0.720]
Weighted average	−0.754		0.000**	95% CI [−0.888, −0.619]

Note. SD = standard deviation; CI = confidence interval.
*$p < .05$, **$p < .01$.

Table 4
Summary of Tau Analysis Comparing Postcontrol Phase (B) With Post-ImR Intervention Phase (C) Across Daily Measures of Distress

Case	Tau	*SD* Tau	*p* value	90% CI
A	−0.964	0.164	0.000**	[−1.235, −0.694]
B	0.000	0.164	1.000	[−0.236, 0.236]
C	−0.359	0.170	0.035*	[−0.639, −0.079]
D	−0.986	0.172	0.000**	[−1.269, −0.704]
E	−0.978	0.166	0.000**	[−1.252, −0.705]
F	−0.843	0.170	0.000**	[−1.122, −0.564]
Weighted average	−0.687		0.000	95%CI [−0.998, −0.718]**

Note. SD = standard deviation; CI = confidence interval.
*$p < .05$, **$p < .01$.

Table 5
BDD-YBOCS Score From Assessment to 6-Month Follow-Up

Participant	Assessment	End of baseline	Postcontrol	Post-ImR therapy	3-month follow-up	6-month follow-up (% improvement from assessment)
A	32	32	34	16	12	6 (81)[a, b]
B	22	22	22	22	24	22 (0)
C	34	34	36	32	32	32 (6)
D	20	20	20	10	8	8 (60)[a]
E	28	26	28	18	18	12 (57)[a, b]
F	36	34	32	20	16	10 (72)[a, b]

Note. BDD-YBOCS = Yale–Brown Obsessive Compulsive Scale modified for BDD.
[a] Reliable improvement.
[b] Clinically significant change.

RELIABLE AND CLINICALLY SIGNIFICANT CHANGE ON THE BDD-YBOCS

After the control intervention, no participant made reliable improvement on the BDD-YBOCS (Reliable Change Index of 5 points) nor met Criterion A, for clinically significant change (score of below 22 on the BDD-YBOCS). After ImRs, four participants (A, D, E, and F) showed reliable improvement in their symptoms and two remained unchanged. This translated into clinically significant change for participants A, E, F. Participants A and D achieved at least a 50% reduction in scores. At 6-month follow-up, Participants A, D, E, and F continued to improve and met both the >30% and >50% reduction in symptoms benchmark, with an overall reduction in scores ranging from 57 to 81%. Participants B and C showed minimal improvement (see Table 5).

BECK DEPRESSION INVENTORY

Three participants showed reliable improvement (>9 points) in their score from baseline to 6-month follow-up (Participants A, E, and F; see Table 6). Participant E achieved clinically significant change (score below 14).

Discussion

This study set out to test the efficacy of a single session of ImR to improve BDD symptoms; it was compared with a single session of simply talking about an aversive memory. A single-case experimental design was used that allowed the process of change to be examined as well as the impact of the intervention on BDD symptoms. The study found ImR improved preoccupation and distress in four out of the six participants. Of note is that this change started to occur within the first week postintervention and continued up to 6 months follow-up. Interestingly, these participants also showed a shift in their model of BDD from that of a physical defect to a psychological problem, shortly after ImR. Participants without improvement in symptoms maintained their "physical" explanation. Changes in BDD preoccupation and distress measured by daily monitoring were also reflected in the standardized measures of BDD severity and depression. This indicates that a single stand-alone session of ImR resulted in clinically meaningful improvement for the majority of participants and was sustained at follow-up.

Table 6
BDI Score and Percentage Change From Assessment to 6-Month Follow-Up

Participant	Assessment	End of baseline	Postcontrol	Post-ImR therapy	3-month follow-up	6-month follow-up (% improvement from assessment)
A	40	40	32	22	22	14 (65)[a]
B	21	21	21	21	21	21 (0)
C	37	36	36	37	36	36 (3)
D	15	15	15	10	10	10 (33)
E	36	34	31	24	24	13 (64)[a, b]
F	36	34	32	21	21	15 (58)[a]

Note. BDI = Beck Depression Inventory.
[a] Reliable improvement.
[b] Clinically significant change.

Our findings are consistent with the findings of other trials of ImR across a variety of conditions including social phobia (Wild et al., 2008) and PTSD (Hackmann, 2011). In common with Wild et al. (2008) and Nilsson et al. (2012), an interesting feature of the intervention was the speed with which change occurred. Improvement in preoccupation and distress occurred within 5 days of ImR for participants for whom the intervention was beneficial. This highlights the potency of imagery-focused interventions and supports the assertion made by Holmes and Mathews (2010) that imagery may amplify emotional experience. Hence, it can then be speculated that the positive impact of the altered image is also magnified. To put the results into clinical context, individuals with BDD can require multiple therapeutic sessions over a number of weeks before change occurs. Equally, trials to date that show CBT to be an effective treatment for BDD have used at least 12–16 sessions. The gains are greater than reported on the BDD-YBOCS in an RCT (Veale et al., 2014; Wilhelm et al., 2014). However, we would be extremely cautious about these results, as this report is of a small number of relatively selected cases. Furthermore, the aim was to investigate its utility as a module in CBT for BDD and determine if the ImR was different from just talking about an aversive memory linked to its image.

In all participants the control intervention of describing a memory that they felt related to their concerns about their appearance had relatively little effect. Our hypothesis is that since participants were being asked to describe the relevant event without using the first-person present tense and without imagery, no emotional processing or reframing is likely to have occurred. It might be that ImR can help engage people in a psychological model of BDD by focusing on concrete experiences that have contributed to the development of emotional problems other than current appearance concerns—for example, that the shame sufferers feel about their appearance is a product of humiliation felt when teased as a younger person, rather than a result of how they look. Other elements of traditional behavioral and cognitive therapy (such as behavioral experiments and alternative data logs) can be framed as helping to "update the system," helping the mind to see the bad experiences as exceptions rather than the norm.

Our results show that the strength of the belief in the psychological model increased in those participants who improved after ImR. For Participants A, D, and F this shift in understanding occurred *before* the improvement in symptoms. However, our clinical impression was that ImR also enhanced engagement in psychological understanding prior to the change in Participants A, D, E, and F and that this was consistently reported by the four improved participants as the dimension of their problems that they felt changed most after the ImR. The most obvious explanation is that a shift in their view of their appearance as an emotional problem was the most important aspect of reducing their preoccupation and distress. Further research is required into different approaches to assess this construct and the sequence of change of different variables.

Although the data presented here support the idea that ImR could be efficacious in BDD, two of the six participants did not respond to the intervention. Clinical impression and feedback from the participants suggests that these participants found the intervention less credible, and that they were less able to engage in vivid imagery rescripting. Imagery rescripting seems to have worked best in those examples when the participant reported the image as highly vivid. The relevance of vividness of visual imagery might be a fruitful area to explore when evaluating which participants might respond particularly well to ImR. In particular, this could involve the exploration of different degrees of vividness and different types of imagery related to sensory modality. One standardized measure that could be used is the vividness of a visual imagery questionnaire (Marks, 1973). A further line of inquiry might investigate whether a certain level of openness to the notion that one has a psychological rather than an appearance problem has an effect on engagement. Identifying whether there is an association between perceived credibility and efficacy of imagery prior to ImR and the level of improvement would help in the understanding of whether this is a predictor of response.

The failure of the intervention to provide any benefit for two participants initiates reflection as to whether the intervention could be modified. First, to target lack of "buy-in" to the imagery-based intervention a pre-ImR phase could be developed to target doubts and reservations. This could take place some weeks prior to the start of the intervention or until patients reached a certain threshold of engagement in the use of imagery. Second, it is not yet known if cognitive restructuring is an essential component of ImR for BDD. Nilsson et al. (2012) showed significant reduction in symptoms of social phobia without cognitive restructuring and focusing on providing what the child needed and changing the context of the memory. These adaptations of the intervention could be tested using a more sophisticated SCED tracking mediational variables, potentially within session, which would allow data to be obtained, telling us precisely *if* and *when* these changes occur.

This study provides evidence highlighting the potential of ImR as a useful intervention for individuals with BDD. However, it would be premature to generalize the findings and recommend its use for all individuals. Instead, this study should initiate further research to refine the intervention technique and identify individuals for whom it will be most effective. A series of larger SCEDs could systematically investigate whether individuals without clearly identifiable images linked to aversive memories would benefit (individuals were recruited for this study if they had such memories), whether certain individuals who do not initially respond to the single intervention would improve with multiple sessions, whether those with "realistic" ImR have better outcomes, or whether those with ImR with an alternative explanation for the protagonists' negative responses to appearance have a better outcome (e.g., Participant D described her adult self offering reassurance that it was her mother's anger problem that was to blame for the names that she was called).

LIMITATIONS

One limitation is that the first author (R.W.) solely conducted all aspects of treatment and the observer-rated BDD-YBOCS and this may have introduced a bias in this measure. This would be a significant flaw if the BDD-YBOCS were the primary outcome measure. However, the study is consistent with the tradition in single-case design that the daily self--report measures are the primary outcome measures and that any evidence for efficacy is derived by the comparison between phases on the daily diary recordings of preoccupation and distress.

A further limitation of the study is that there were no integrity checks (i.e., independent evaluator of adherence of the therapist to ImR intervention). The therapist had, however, been trained in the intervention and received regular supervision, which routinely uses audio recordings. Therefore, it is not possible to clearly demonstrate that the intervention was effective because it was ImR per se rather than nonspecific strategies. A replication of this study should rectify this limitation by recording all sessions and randomly selecting a proportion for evaluation by an independent assessor and validating an adherence scale. Furthermore, a future study could assess the efficacy of the intervention by replicating across multiple therapists, to determine if specific therapist factors are important.

The fact that three of the participants (A, C, and D) had previously engaged in CBT, and Participants A and D were among those who responded, could be seen as a confounding variable. While it may have had some preparatory value and potentially helped make the psychological account plausible, we note first that previous therapy had taken place at least 6 months before assessment for this study; second, that all participants met inclusion criteria and clinical levels on all standardized symptom measures; and third, showed stable baselines and little or no response to the control intervention on the primary outcome measures (preoccupation and distress). We would suggest therefore that this does show ImR may have promise for individuals with stable and potentially refractory problems.

Last, we have considered whether the offer of evidence-based CBT at no charge at the end of 6 months may bias the results. However, in this country, CBT is available at no charge in the state sector and so there is a disincentive for participating in research in this setting as participants could have received CBT in the state sector much earlier. Furthermore, the credibility of CBT in BDD and the expectancy for change during treatment has been rated as extremely low in one trial (Veale et al., 2014) and so the promise of CBT after 6 months is unlikely to bias the results.

Conclusions

In summary, this study shows that ImR may be a useful component for treating BDD in individuals with BDD who report aversive memories that are emotionally linked to their imagery. The choice of an SCED enabled exploration of *how* the ImR may achieve its effects and informed the direction of future development of the intervention. A focus on the processes underpinning ImR fits with the desire expressed by researchers to improve understanding of mechanisms of change in psychotherapy (Carey, 2011). We would also suggest that if ImR is used as a module, then use it early in therapy to help engage a client in a psychological understanding of the problem to maximize any gains early on in treatment.

Conflict of Interest Statement

The authors declare that there are no conflicts of interest.

Appendix A. Supplementary data

Supplementary data to this article can be found online at http://dx.doi.org/10.1016/j.beth.2015.08.006.

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