

Running Head: THOUGHT COPING STRATEGIES IN AN AND BDD

Accept, distract, or reframe? An exploratory experimental comparison of strategies for coping with intrusive body image thoughts in anorexia nervosa and body dysmorphic disorder

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Abstract

Negative body image is the hallmark of anorexia nervosa (AN) and body dysmorphic disorder (BDD). One aspect of body image, appearance-related thoughts, have shown to be a major contributor to relapse, thus further investigation of successful treatment strategies targeting these maladaptive thoughts are warranted. The present study tested an acceptance/mindfulness (AC), a cognitive restructuring (CR), and a distraction strategy with regard to their short-term effectiveness of reducing the frequency of thought occurrence and associated outcomes in participants with AN ($n = 20$), BDD ($n = 21$), and healthy controls (HC; $n = 22$). Although all strategies led to a significant reduction of thought frequency, there was no group x strategy interaction effect in their reduction. Positive affect increased in the BDD group through the AC strategy, but decreased in healthy controls. Acceptance of the thought increased in the CR strategy in AN, whereas that strategy seemed to work least for BDD. Healthy controls showed most acceptance when using distraction. Taken together, the study suggests that all strategies might have their benefits and that it might be worthwhile further investigating differential indication of the strategies with regard to diagnosis and individual factors.

Key words: body image, anorexia nervosa, body dysmorphic disorder, acceptance, cognitive restructuring, distraction

1. Introduction

Anorexia nervosa (AN) and body dysmorphic disorder (BDD) are both severe disorders with significantly elevated mortality rates compared to other psychiatric disorders (standardized mortality ratios of 31 and 45, respectively; Arcelus et al., 2011; Phillips and Menard, 2007). Given the severity and risk associated with both of these disorders, it is essential to elucidate their maintaining factors. Specifically, body image disturbance appears to be an important contributing factor to both of these disorders (Hartmann et al., submitted; Hrabosky et al., 2009; Kollei et al., 2012), making this core concept a relevant target for treatments (e.g. Vocks and Legenbauer, 2010; Wilhelm, et al., 2013). Research aimed at improving existing or developing new treatment strategies is still needed, especially with regard to appearance-related concerns and thought control strategies as they have shown to contribute to the risk of relapse after successful weight restoration in AN (Carter et al., 2004).

The *Diagnostic and Statistical Manual for Mental Disorders fifth edition (DSM-5)* criteria for AN describes negative body image as “disturbance in the way in which one's body weight or shape is experienced, undue influence of body shape on self-evaluation, or denial of the seriousness of the current low body weight“ (p. 339), whereas the BDD criteria reads as follows; “perceived defect(s) or flaw(s), that is not observable or appears slight to others” (American Psychiatric Association [APA], 2013; p. 242). Three studies to date have shown comparable severity of body image disturbance and body dissatisfaction between individuals with AN and those with BDD (Hrabosky et al., 2009; Kollei et al., 2012; Rosen and Ramirez, 1998) with a trend towards greater severity among individuals with BDD (Hrabosky et al., 2009; Kollei et al., 2012). Moreover, Hartmann and colleagues found that individuals in both disorders with appearance or body image beliefs show comparable levels of delusionality (i.e.,

the thought that perceived fatness or flaws were actually true and also noticeable to others; Hartmann et al., 2013), with slightly more delusional cases in BDD. To deal with these negative appearance-related thoughts, individuals with either disorder employ their own maladaptive strategies. As mentioned in the DSM-5 criteria individuals with BDD tend to perform repetitive behaviors such as mirror checking, excessive grooming and mental acts such as comparing themselves to others in response to the appearance-related thoughts, while individuals with AN engage in persistent behavior that interferes with weight gain such as dieting and excessive exercising (APA, 2013, p. 242 and 338). Research, so far, has confirmed the criteria showing that individuals with these disorders display more avoidance and less positive rational acceptance (Hartmann et al., submitted), more appearance fixing (the behaviors mentioned above; Hrabosky et al., 2009; Hartmann et al., submitted) as well as more rumination and confrontation with appearance-related thoughts (Kollei et al., 2012) than those without the disorder. However, research suggests that these behaviors are usually not functional or adaptive, and may contribute to the maintenance of the disorder (e.g. in BDD: Veale et al., 1996). It is therefore essential to find ideal treatment strategies, which may address these common thoughts, potentially in a transdiagnostic way.

Currently, state-of-the-art treatment for body image issues in both disorders includes elements of cognitive behavioral therapy (CBT) focusing on body image (Fairburn, 2008; Wilhelm et al., 2013). CBT for body image problems typically consists of a (mirror or video) exposure component and a cognitive restructuring of beliefs and thoughts component. The cognitive aspect focuses on specific idiosyncratic thoughts (“I am too fat” or “My nose is disgusting and looks like a pig’s nose”) and works by questioning the evidence and/or usefulness of such thoughts depending on the level of

delusionality. Research to date has supported the effectiveness of cognitive behavioral therapy for BDD-pathology in general (e.g., Wilhelm et al., 2011; Wilhelm et al., 2014).

Beyond CBT, there is preliminary evidence in support of, besides other third wave procedures, a newer form of cognitive treatment aimed at targeting these thoughts, called acceptance and commitment therapy (ACT; Hayes, et al., 2012). Preliminary evidence for the potential utility of ACT in treating AN comes from a case series in patients with AN that alludes to the success of ACT strategies in overall therapy outcome (Berman, et al., 2009; Heffner, et al., 2002). Additionally, add-on group treatments for AN in addition to treatment-as-usual (TAU) led to trends toward larger increases than TAU only (Juarascio et al., 2013). To our knowledge, no studies have evaluated the efficacy of ACT for BDD. However, initial evidence for the efficacy of ACT exists for disorders associated with BDD such as OCD (e.g., Twohig et al., 2010; Twohig, et al., 2006), anxiety disorders (Arch et al., 2012), and compulsive skin picking (Twohig et al., 2006). ACT is organized around the construct of psychological flexibility. Psychological flexibility is characterized by six behavioral components which include, present-moment focus, cognitive defusion, experiential avoidance, transcendent self-awareness, valued living, and committed action (for an overview see, i.e., Luoma, et al., 2007). In particular, cognitive defusion (i.e., techniques to achieve a distancing between thoughts and reality as well as the realization that thoughts are only thought), acceptance (i.e., learning to avoid experiential avoidance), and mindfulness (i.e., learning to be in the present moment) are processes that may be particularly helpful in dealing with intrusive appearance-related thoughts. Of note, these techniques are employed not only within ACT but also are part of other treatments such as the mindfulness-based cognitive therapy (i.e., Seagal, Williams, & Teasdale, 2013) and dialectical behavior therapy (Linehan, 1993). To our knowledge, no studies to date have

compared the short-term effectiveness of an acceptance/mindfulness (AC) and a cognitive restructuring (CR) strategy for targeting intrusive, negative appearance-related thoughts among individuals with BDD and AN in an experimental setting. Such studies would indicate whether larger-scale treatment trials of AC strategies are warranted, given the evidence base for CBT in both disorders. Therefore, we aimed to explore the currently most intrusive negative appearance-related thoughts in groups of participants with AN and BDD, and healthy controls and to determine which cognitive strategy would be most successful in decreasing such thoughts. To that end, we randomized each participant to testing either an AC, a CR, or a distraction strategy with their target thought for five minutes, after they had already tested a baseline strategy for five minutes. We expected all strategies to be more successful than baseline (monitoring-only) with regard to reduction of frequency of thought occurrence, discomfort with the thought and affect across all groups, as distraction has also shown to be effective over a short time (Najmi, et al., 2009). Furthermore, we hypothesized that the ACT- and CR-based strategies would perform equally well in all appraisal ratings, except for in thought reduction. We hypothesized the CR-strategy would be more effective in thought reduction than would the AC strategy, given that the focus in ACT is not to reduce or change the thoughts, but rather to accept them (Hayes, et al., 2012). Finally, we expected that the group with BDD might benefit more from the AC strategy due to the greater proportion of individuals with delusional beliefs (Hartmann et al., 2013) and the CR-strategy to perform better in participants in AN, given the lower count of individuals with delusional body image beliefs AN compared to BDD (Hartmann et al., 2013).

2. Methods

2.1 Participants

The Partners Human Research Committee at Massachusetts General Hospital approved the study protocol and the Institutional Review Board at McLean Hospital ceded review to the former. We recruited participants for all groups through flyers and advertisement ($n=37$), intakes in outpatient clinics ($n=24$), and residential settings ($n=15$). Inclusion criteria for the study consisted of an age of 18 years or older and a primary diagnosis (defined as most interfering/most distressing diagnosis) of either AN or BDD according to the Diagnostic and Statistical Manual of Mental Disorders (DSM-IV-TR; American Psychiatric Association (APA), 2000) diagnostic criteria. Only BDD participants with a score on the Yale-Brown Obsessive Compulsive Scale adapted for BDD (Phillips et al., 1997) of ≥ 20 were included in the study, as a previous study has derived this cut-off as an indicator of significant body image concerns (Deckersbach, Wilhelm, Otto, Savage, Buhlmann, 1998). Amenorrhea was not required for AN participants in order to make the sample more comparable to studies using current DSM-5 criteria and as it has been shown that individuals with AN with or without amenorrhea do not differ much psychologically (Attia and Roberto, 2009). The participant's weight needed to be below the 85th percentile according to the medium frame weight for height and gender on the 1959 Metropolitan Life Insurance Tables. Items from the Eating Disorder Examination (Fairburn, et al., 2008; see measures) were used to determine diagnostic criteria in AN (i.e., "maintain low weight" = 1; "fear of weight gain" ≥ 4 ; and "importance of weight," "importance of shape," or "feeling fat" ≥ 4 ; all for the past 3 months). Exclusion criteria in the clinical groups included a current diagnosis of substance abuse/dependence, psychotic disorder, bipolar disorder, or a past or comorbid diagnosis of AN and BDD (weight and shape concerns could be present in

BDD or other concerns in AN, but only if they have never been primary and most distressing). For the entire sample, further exclusion criteria included homicidality, current clinically significant suicidality, non-corrected visual impairments (due to the impairment's potential impact on the on-screen tasks), significant CBT treatment experience for either disorder (> 10 CBT or therapies including acceptance and mindfulness-based techniques sessions in a group or individually in the last 10 years), neurological or somatic conditions interfering with dependent variables (reaction time), and any self-identified difficulties reading and/or understanding English. In addition, individuals in the healthy control (HC) group with any current diagnosis or history of a mental health disorder were excluded.

Of 76 potential participants, six participants needed to be excluded due to previous CBT- and ACT experience (AN: $n = 4$; BDD: $n = 2$). Another three participants (AN: $n = 1$; BDD: $n = 2$) were excluded from the study as they did not meet criteria in the on-site more detailed diagnostic session, and four participants from the AN group could not complete the study after initially starting it (due to insurance issues resulting in a change of treatment facility ($n = 3$) or being too distressed by the questions ($n = 1$). Ultimately, 63 individuals (AN: $n = 20$, BDD: $n = 21$, HC = 22) took part.

2.2 Interviews

To confirm diagnosis and assess delusionality of appearance beliefs, as well as other comorbid or past mental disorders, doctoral level clinicians interviewed participants using the following clinician-rated interviews.

2.2.1 Brown Assessment of Beliefs Scale (BABS; Eisen, et al., 1998)

This 7-item semi-structured clinician-administered interview assesses current

delusional thinking. The BABS initially assesses the dominant belief about appearance/perceived flaws. After determining the patient's most salient appearance concern (e.g., "I am unbelievably fat" in AN or "I look disgusting due to my crooked big nose" in BDD), the assessor then rates six items on the patient's insight surrounding the veracity of beliefs about their perceived flaws, and the corresponding level of delusion. A previous study with a subsample of the present sample has reported a high intra-class correlation coefficient was high for the total score (ICC = 0.85, 0.59-0.95 with 95% CI; Hartmann et al., 2013), and the internal consistency of the scale was acceptable in the present study (Cronbach's $\alpha = .80$).

2.2.2 Eating Disorder Examination (EDE Edition 16.0D; Fairburn, Cooper, & O'Connor, 2008)

The semi-structured interview assesses presence and severity of eating disorder symptoms on four scales (restraint, eating, weight and shape concern), and allows for the diagnosis of AN, bulimia nervosa and binge eating disorder. We also employed it in in the BDD sample, a population for which it has not been validated yet. Previous studies have shown good inter-rater reliability for total score and scales with correlations from .65 to .96 (Grilo et al., 2004). The scales and the total score showed high internal consistency in the current study (Cronbach's alpha ranged from .86 [eating concern] $\leq \alpha \leq$.96 [total score]).

2.2.3 Pharmaco- and Psychosocial Treatment History.

Through a semi-structured interview, we assessed the participants' current and past medication (including dosage, duration of intake, and impact on AN or BDD, respectively) as well as current and past psychosocial treatment (including the provider's background, the form of treatment [CBT vs. other], the setting [single vs. group], and the impact on AN or BDD, respectively).

2.2.4 Structured Clinical Interview for DSM-IV (SCID).

The SCID-I/P is a semi-structured clinical interview used to diagnose Axis I disorders (First et al., 2002), and was used to determine participants' psychiatric diagnoses.

Previous studies have demonstrated satisfactory inter-rater reliability for the different diagnoses ($0.61 \leq ICC \leq 0.83$; Lobbestael et al., 2011).

2.2.5 Yale Brown Obsessive Compulsive Scale Modified for Body Dysmorphic Disorder (BDD-YBOCS; Phillips, et al., 1997)

The BDD-YBOCS is a 12-item semi-structured clinician-rated instrument designed to rate severity of body dysmorphic disorder (BDD). In participants with AN (for whom the BDD-YBOCS is not validated yet), the rating focused on AN symptom severity, thus ratings of shape and weight concerns were also included in the total score for the AN but not for the BDD subsample. Prior studies have shown excellent inter-rater reliability in BDD samples (Phillips et al., 1997). The measure had high internal consistency in the current study (Cronbach's $\alpha = .97$).

2.3 Self-reports

The participants completed the following questionnaires in REDCap, an electronic data capturing system (Harris et al., 2009).

2.3.1 Appraisal Ratings.

On this scale, participants rated the distress associated with their appearance-related thoughts, as well as acceptance of, urge to act against, and effort to suppress on a scale from 1 (nothing to all) to 10 (very strongly) (analogous to Marcks and Woods, 2005).

2.3.2 Body Image Disturbance Questionnaire (BIDQ; Cash, et al., 2004)

The BIDQ is derived from the Body Dysmorphic Disorder Questionnaire (Dufresne et al., 2001). The self-report 7-item measure assesses appearance-related concerns and preoccupation. The measure had high internal consistency in the current study (Cronbach's $\alpha = .96$).

2.3.3 Beck Depression Inventory (BDI-II; Beck, et al., 1996).

The BDI consists of 21 items measuring the intensity of depression symptoms. The scale demonstrated high internal consistency in the present study (Cronbach's $\alpha = .97$).

2.3.4 Usefulness of Strategies

In a one-item format, the participants were asked whether they thought the thought control strategy they have been randomized to was helpful (yes/no format).

2.3.5 Positive and Negative Affective Schedule (PANAS; Watson, et al., 1988)

This 20-item instrument is comprised of two affect scales, one measuring positive affect and the other measuring negative affect. For the present study, participants were instructed to rate the feelings for the present moment / right now. The internal consistencies of the two scales were high (Cronbach's $\alpha = .85$ [positive] and $.84$ [negative]).

2.4 Procedure

All participants took part in the experiment in one of two office rooms. In both rooms, they were sitting at a table directed towards a wall without pictures. We used a modified version of the paradigm of Marcks and Woods (2005) to examine the usefulness of different strategies to cope with intrusive appearance-related thoughts. As part of this paradigm, we first explored the most burdensome and intrusive appearance-related thought in a semi-structured approach referring the patient to

information he or she has already disclosed in previous structured interviews (BDD-YBOCS, EDE, and BABS). In healthy controls, if problems existed to identify a respective thought the researcher added the following questions to guide the participant: “Are there areas of your body that you are not as satisfied with as with others? If you could change something on your body, what would it be?” Then, the participants rated their baseline affect in the PANAS. Subsequently, the participants received the monitor-only strategy for baseline condition. Participants spent five minutes on their own and were asked to count the frequency (using a hand-held golf counter) of which the thought occurred while they were applying the strategy outlined in the instructions (they were asked to apply the strategy for the five minutes). Afterwards they completed the affect (PANAS) and appraisal ratings. Then, they were randomized to receive one of three interventions: a distraction, or acceptance/mindfulness or cognitive restructuring-specific instruction (see below). Again, participants spent five minutes on their own and were asked to count the frequency at which the thought occurred while they applied the strategy outlined in the instructions. Subsequently, participants completed the affect (PANAS) and appraisal ratings as well as the questionnaire asking for the usefulness of the strategies.

Instructions

2.4.1 Monitor-only Strategy.

During the next 5 min, you may think about anything you like. You might think of your target thought, but you do not have to. However, if at any time you think of your target thought, please record the occurrence of the thought by pressing the button

once for each occurrence. It is important that you continue in the same way for the full 5 min.

2.4.2 Acceptance/Mindfulness Strategy.

During the next 5 min, please record occurrences of your target thought with your handheld device. It is very important that you try to imagine sitting beside a stream noticing a bunch of leaves floating on the water. When your target thought occurs put it on a leaf floating on the water. The leaf drifts towards you, slowly passes you, and finally drifts out of your range of sight. Keep doing that whenever your target thought occurs. Be sure to record your target thought if it occurs by pressing the button once for each occurrence. It is important that you continue the same way for the full 5 min.

2.4.3 Cognitive Restructuring Strategy.

During the next 5 min, please record occurrences of your target thought with your handheld device. It is very important that you try to analyze the thought as follows: Think how you coped with your target thought in the past, and try to reflect if the thought is realistic and justifiable, and if others would think the same if they were in your place. Ask yourself if there is an alternative thought if the original proves not to be useful or valid. Be sure to record your target thought if it occurs by pressing the button once for each occurrence. It is important that you continue the same way for the full 5 min.

2.4.4 Distraction Strategy.

During the next 5 min, please record occurrences of your target thought with your handheld device. Every time the thought occurs, please try to think of anything else. Attempt to distract yourself by another thought, sentence or image, but still be sure to record it if it occurs by pressing the button once for each occurrence. It is important that you continue the same way for the full 5 min.

2.5 Data Analysis

Regarding demographic and clinical characteristics of the sample, we analyzed group differences between the three groups (AN, BDD, HC) in demographic variables and questionnaire subscale scores using analyses of variance (ANOVAs) with subsequent post-hoc tests corrected for Bonferroni-Holm (Holm, 1979) as well as chi square tests for categorical data.

In order to test hypotheses, we performed repeated measures analysis of variance for differences in thought occurrence, differences in positive and negative mood as well as in appraisal ratings from post baseline to post experimental condition (between-subject variables: groups and randomized strategy; dependent variable [one per ANOVA]: changes in frequency of thought occurrence, positive and negative mood, and appraisal ratings). If the interaction effect was significant, we examined main effects as well as post-hoc tests corrected for Bonferroni-Holm (Holm 1979) (due to the sparse previous data no contrasts were specified).

We included level of delusionality, current SSRI and atypical antipsychotic medication, and depression (due to significant group differences between clinical groups; see results) as covariates in an ANCOVA for significant post-hoc tests found previously.

We calculated effect sizes of group differences as $p\eta^2$ (0.01 = small effect, 0.06 = medium effect, 0.14 = large effect; Cohen, 1973), and Cramer's V for categorical data ($V > 0.1$, small effect; $V > 0.3$ medium effect; $V > 0.5$, large effect; Cramér, 1999).

3. Results

3.1 Participants' demographic and clinical characteristics

Results revealed no demographic differences in age, race, ethnicity, and marital status between the groups (Table 1). The AN group showed greater psychopathology (EDE, BDD-YBOCS [only including shape and weight concerns in AN], and BDI-II) than the other groups, and individuals with BDD also showed higher scores in all these measures than the healthy controls. Illness duration did not differ between the two clinical groups. Furthermore, as expected, the AN group had a lower BMI than the two other groups. The BDD group displayed higher delusional beliefs of their appearance-related beliefs but fewer individuals of the group currently took atypical antipsychotics and/or SSRIs. Because these two variables could have interacted with the success of the experimental thought control strategies tested in the present study, we included these variables as covariates in the between-group analyses. A total of 11 participants of the An group were recruited from an inpatient setting (55.0%). The AN group consisted of 5 individuals with restrictive type (25.0%) and 15 individuals with binge/purge type (75.0%).

- *insert Table1 here*-

3.2 Manipulation check and estimation of usefulness of strategies

Of the 20 participants randomized to the distraction strategy, 17 in fact employed the strategy, with no group differences (χ^2 (df=2) = 2.07, $p = 0.35$). Fourteen out of 21 participants randomized to the acceptance/mindfulness strategy did use the strategy without group differences in usage (χ^2 (df=2) = 4.70, $p = 0.90$). Finally, 20 out of 22 participants randomized to the cognitive restructuring strategy did employ it, yielding on group difference (χ^2 (df=2) = 2.10, $p = 0.35$). Groups did not differ in the duration of the time they used the strategies (all $p > 0.29$).

Randomized strategies were employed at least 40% of the five minutes (across strategies and groups).

When asked whether they found the randomized strategy useful to deal with the appearance-related thought, 13 of the 20 (65.0%) participants randomized to distraction reported finding it helpful, and the groups did not differ in this rating (χ^2 (df=2) = 2.84, $p = 0.24$, $V = 0.38$). Eight of the 22 participants (36.4%) randomized to the cognitive restructuring-strategy found it helpful, and 14 of the 21 participants (66.7%) randomized to the ACT-based strategy found it helpful, with no significant group differences in either rating (χ^2 (df=2) = 2.79, $p = 0.25$, $V = 0.36$ and χ^2 (df=2) = 4.62, $p = 0.10$, $V = 0.48$, respectively).

3.3 Baseline condition – Frequency of thought occurrence, affect, and appraisal

During the baseline (monitor-only) condition, the clinical groups showed a significantly higher frequency of thought occurrence than healthy controls, with the AN group reporting the highest frequency (Table 2). Both, pre and post the baseline condition, individuals with AN also showed more negative affect (lower positive and higher negative PANAS) than the healthy controls, with the AN group reporting a higher negative PANAS subscale score than both other groups. The group x time interaction was significant for positive affect ($F(2,60) = 3.17$, $p < 0.05$, $p\eta^2 = 0.05$), though not for negative affect ($F(2,60) = 0.26$, $p = 0.78$, $p\eta^2 = 0.01$). Moreover, the BDD group showed a larger reduction in positive affect compared to the AN group (both $p < 0.05$) following the thought exercise. However, as anticipated, positive affect decreased significantly across all groups ($F(1,60) = 39.10$, $p < 0.001$, $p\eta^2 = 0.39$). With regard to appraisal ratings, the clinical groups reported more dysfunctional strategies, meaning more attempts to suppress the thought, more

associated discomfort, and a stronger urge to do something about it, but less acceptance of it than did the healthy controls.

- insert Table 2 here -

3.4 Experimental condition - Short-term effectiveness of strategies in frequency of thought occurrence, affect, and appraisal

As hypothesized, all participants reported a significant reduction of appearance-related thoughts from baseline to experimental condition ($F(1,60) = 13.14, p < 0.01, \eta^2 = 0.15$) regardless of strategy and group. There was no significant interaction effect of group x randomized strategy with regard to thought reduction from the baseline condition to the experimental condition ($F(4,54) = 1.45, p = 0.23, \eta^2 = 0.10$).

With respect to affect, there were trendwise significant interaction effects group x strategy for the difference from post baseline to post experimental condition of PANAS positive ($F(4,54) = 2.16, p = 0.09, \eta^2 = 0.14$) and negative ($F(4,54) = 2.42, p = 0.06, \eta^2 = 0.15$) affect. With the exception of a group effect in positive affect ($F(2,54) = 4.28, p < 0.05, \eta^2 = 0.14$), there was no main effect (all $p > 0.13$). For PANAS positive affect, the post-hoc test between the BDD and HC groups was significant ($p < 0.01$), indicating that the BDD group benefited from the AC strategy, while this strategy actually decreased positive affect for the HC group (see Figure 1). Furthermore, a significant AN-HC post-hoc test indicated that distraction is useful for AN in contrast to the harmfulness of this strategy for the HC group with regard to positive affect ($p < 0.05$). For PANAS negative affect, no post-hoc test was significant (all $p > 0.09$).

- insert Figure 1 here -

Regarding the change in appraisal ratings from post baseline to post experimental condition yielded one significant group x strategy interaction effect in rating of acceptance of the thought ($F(4,54) = 3.07, p < 0.05, \eta^2 = 0.19$; p s for all other interaction effects of differences in appraisal ratings ≥ 0.23). The interaction effect was significant for the AN-HC ($p < 0.05$) and trendwise for the AN-BDD post-hoc tests ($p = 0.06$; see Figure 2 where negative scores denote greater gains in acceptance). Specifically, individuals with AN endorsed greater acceptance when using the CR strategy, while healthy controls benefitted most from distraction.

- insert Figure 2 here -

3.5 Impact of covariates medication with SSRIs or atypical antipsychotics and level of delusionality on the short-term effectiveness of the strategies

In order to check for the impact of the level of delusionality (BABS sum score) the use of SSRIs and atypical antipsychotics, and depression level (BDI-II sum score) on the findings, we introduced these variables as covariates in the previously significant post-hoc tests. The group x strategy interactions of BDD and HC ($F(2,36) = 5.32, p < 0.01, \eta^2 = 0.23$) and AN and HC ($F(2,36) = 4.00, p < 0.05, \eta^2 = 0.16$) with regard to positive affect remained significant after including the level of delusionality as a covariate. However, the post-hoc tests involving AN and BDD with regard to the acceptance of the thought was not significant anymore ($F(2,33) = 3.09, p$

= 0.06, $p\eta^2 = 0.13$). The post-hoc tests between AN and HC with respect to acceptance of the thought still yielded a significant result ($F(2,33) = 3.31, p < 0.05, p\eta^2 = 0.17$).

The group x strategy interactions of BDD and HC ($F(2,34) = 4.97, p < 0.01, p\eta^2 = 0.22$) as well as AN and HC ($F(2,34) = 3.95, p < 0.05, p\eta^2 = 0.16$) with regard to positive affect remained significant after including medication as a covariate. The post-hoc test involving AN and BDD with regard to the acceptance of the thought remained trendwise significant ($F(2,32) = 2.80, p = 0.08, p\eta^2 = 0.15$). The post-hoc test between AN and HC with respect to acceptance of the thought, however, became non-significant ($F(2,33) = 2.41, p = 0.11, p\eta^2 = 0.13$).

The covariate depression did not change any of the significant post-hoc tests: group x strategy interaction of BDD and HC ($F(2,32) = 4.24, p < 0.05, p\eta^2 = .21$), as well as AN and HC ($F(2,34) = 2.99, p < 0.05, p\eta^2 = 0.15$) with regard to positive affect, group x strategy interaction of AN and BDD with regard to the acceptance of the thought and group x strategy interaction of AN and HC with respect to acceptance of the thought ($F(2,33) = 3.50, p < 0.05, p\eta^2 = 0.13$).

4. Discussion

This study aimed to experimentally examine the differential ability of three strategies in reducing negative appearance-related thoughts, associated discomfort, dysfunctional coping strategies, and negative affect in groups of individuals with AN, BDD and healthy controls.

As expected, findings revealed a significantly higher frequency of appearance-related thoughts in the clinical groups, compared to the healthy controls. Moreover, individuals in the clinical groups displayed more general negative affect than controls. These results are unsurprising given previous studies that show significantly poorer body image (Rosen and Ramirez, 1998) and lower quality of life (de la Rie et al., 2005, Phillips, et al., 2005), and elevated BIDQ and BDI scores in these groups in the present study. Additionally, the group with AN reported a higher frequency of appearance-related thoughts than the BDD group. One potential reason might be that the thought the individuals with AN mentioned covered most of their concerns (i.e., “I am fat”), while the thoughts of the individuals with BDD potentially only covered one of their concerns. Given that individuals with BDD usually have more than one concern (Phillips, Grant, Siniscalchi, Stout, & Price, 2005), a lot of other maladaptive thoughts might have come to their mind, lowering the frequency of the specific target thought.

With regard to performance in the experimental component of the study, the clinical groups also showed greater decreases in positive affect as a reaction to the baseline (i.e., prior to receiving instructions on how to cope with it). This may be attributed to their more dysfunctional coping strategies, illustrated in the form of more attempts to suppress the thought, more associated discomfort, and a stronger urge to do something about it, but less acceptance of it. In previous studies, this maladaptive

coping has been demonstrated through more avoidance and less positive rational acceptance (Hartmann et al., submitted), more appearance fixing (Hartmann et al., submitted; Hrabosky et al., 2009) as well as more ruminating and confrontation with the thought (Kollei et al., 2012).

Regardless of group membership, all strategies led to a reduction of the frequency of the thought and associated discomfort. This is in line with our hypothesis and with the effectiveness of CBT for BDD (Wilhelm et al., 2011; Wilhelm et al., 2014; see Greenberg and Wilhelm, 2011 for a review) and, to a lesser extent, in AN (see Murphy, et al., 2010 for a review). This finding is also in accordance with support for ACT in case series of patients with AN (Berman et al., 2009; Wildes and Marcus, 2011), disorders of the OC-spectrum, thus in disorders related with BDD (Twohig et al., 2010; Twohig, 2009 for review), as well as in a preliminary short ACT-intervention in adults with body dissatisfaction (Pearson et al., 2012). And finally, it also corroborates encouraging findings about the short-term success of distraction in OCD (Najmi et al., 2009).

The findings regarding the differential impact of the strategies on various outcome measures in the different groups were less consistent. In contrast to our expectations based on the theory of ACT (Hayes et al., 1999), the AC strategy was not less successful than the CR strategy in reducing the thought frequency. This is, however, congruous with studies showing comparable outcomes in various disorders using different methodologies in treatment (Arch et al., 2012; Wetherell et al., 2011). Our second hypothesis was partially confirmed. Although the AC strategy seemed to benefit the BDD group in terms of augmenting positive affect, the strategy was detrimental for the healthy controls, which might be because it made them more aware of the thought as they might have been otherwise. The level of acceptance for

the thought increased in the AN group when using the cognitive restructuring strategy. In contrast, healthy controls benefitted most from the distraction strategy. The lack of differential effects of the strategies on the appraisal rating other than acceptance might be due to various speculative reasons. One might argue that discomfort as an emotion was not specific enough, and querying about more specific emotions such as disgust might have yielded effects (Kollei & Martin, 2014). In terms of suppression of the thought, individuals might have learned about the dysfunctionality of this strategy from personal experience, and in terms of urge to do something, exposure time might not have been sufficiently long enough, or it may have been clear to them that leaving and fixing their appearance was not an option.

In addition, when we introduced the covariates current medication and level of delusionality some of the post-hoc tests did not yield significant results. This finding further supports our second hypothesis and might have several reasons. Both variables have previously shown to significantly interact with treatment success. Delusionality, for example, may complicate the accessibility of automatic thoughts by cognitive restructuring in BDD (Greenberg and Wilhelm, 2011). Medication (i.e., high dose SRIs) has shown to be a successful in BDD, in particular in highly delusional individuals (Phillips, et al., 2002; Phillips and Hollander, 2008). There is also preliminary evidence for successful pharmacotherapy with atypical antipsychotics in AN (for a review see McKnight and Park, 2010). However, due to the repeated measures design, there might also be a learning or habituation effect, so that effects are just too small (see also effect sizes) to share variance on many exploratory variables. Moreover, the power in the present study might not be sufficient to accommodate further variables in the design. Lastly, the findings with regard to differential effectiveness might not be as clear-cut, since the strategies, in particular

ACT, may not be readily intuitive to the participants. For ACT, i.e., Harris suggests repeated practice in order to master the exercises (Harris, 2009). It is plausible that more practice might be required to render them as effective as the short-term-proven distraction strategy. This assumption is underscored by the participants' comparable usefulness rating of the strategies.

The present results must be interpreted considering strengths and weaknesses of the study. Weaknesses include the small sample size with $n = 7$ per group and thought control strategy. According to a power analysis with G*Power (Faul, Erdfelder, Lang & Buchner, 2007; effect size $f = 0.25$; err prob = 0.05; Power = .8; number of groups 9; number of measurements = 3; corr among rep measures = 0.5; nonsphericity correction $\epsilon = 1$) a total sample size of $N = 63$, thus seven individuals per group/strategy, is sufficient to find medium sized effects in a repeated measures analysis of variance with 3 time points such as positive and negative affect in the present study. However, a larger study, potentially in a treatment setting is needed confirm this preliminary findings from an exploratory experimental setting. Another possible limitation is that an outpatient and a residential subsample of participants with AN were combined. However, previous studies (i.e., Konstantakopoulos et al., 2012; Steinglass et al., 2007) as well as one of our studies with a subsample of the present study sample (Hartmann et al., 2013) show the comparability of the subsamples in relevant disorder-specific characteristics. Furthermore, individuals with comorbid AN and BDD were excluded to enhance comparability to other studies (Hrabosky et al., 2009; Kollei et al., 2012). Thus, results cannot be translated to comorbid cases. Furthermore, subsamples were characterized by different levels of depression, comorbidity and medication, which can be seen as a limitation, however has allowed as to investigate the impact of this factors on our findings. Additionally,

we have only used general descriptors of affect (PANAS and discomfort) in the present study, further more detailed and specific analyses of emotion and affect might be indicated as it has been shown by Kollei & Martin (2014). Also, one can criticize our choice of the control strategy distraction. Other studies, in particular with regard to pain thresholds, have usually included thought suppression as a comparison strategy (e.g., Braams, et al., 2012). However, this has been widely criticized as a comparison strategy, especially since the rebound effect of this strategy is known (Abramowitz, et al., 2001). To be more conservative, we therefore decided to employ the distraction strategy as an “active control.” Furthermore, we are aware that the techniques chosen do only represent a small percentage of the respective therapy (CBT or ACT) that were feasible to employ in the present experimental setting. Lastly, the study did not involve a follow-up assessment of thought frequency or affect and that might be warranted in a larger training or treatment study that could follow this exploratory experimental study. Strengths of this study include the use of a thoroughly diagnosed sample, gold standard diagnostic measures administered by trained interviewers, and the inclusion of self-reports and experimental measures.

This study shows that different strategies to cope with body image related thoughts might lead to beneficial outcomes in different variables such as thought reduction, affect, and acceptance of the thought. Thus, it underlines the relevance of a thorough assessment of specific body image-related problems in individuals when offering different treatments. In addition, we found that characteristics such as medication or level of delusionality of appearance beliefs should be taken into account when planning different treatments as they may impact their efficacy. Further studies, using disorder-comparative designs, in line with the Research Domain Criteria (RDoC) initiative of the National Institute for Mental Health (Morris and

Cuthbert, 2012), are needed to further contrast the strategies across body image disorders in order to find best-fitting strategies per individual. The study has also implications for further treatment research. The results of this study in an experimental setting warrant a replication in a treatment study, in particular as negative body image and associated conditions have repeatedly shown to be detrimental etiological factors in these disorders, and lingering negative body image related thoughts are predictors for relapse (for eating disorders, e.g., Keel, et al., 2005). Those treatment studies should include the different approaches potentially in a group setting across various disorders considering various factors that might impact treatment outcome and therefore might be important for applying different approaches to different individuals. Clear differential indications are then not only beneficial for the individuals who has a greater chance of receiving most helpful care right away but also for the health care system by saving resources.

Acknowledgements

The present study was supported by a post-doctoral fellowship awarded to Andrea S. Hartmann by the Swiss National Science Foundation (PBSKP1_134330/1 and PBSKP1_140040). We would like to thank all of the individuals who participated in this study.

References

- Abramowitz, J.S., Tolin, D.F., Street, G.P., 2001. Paradoxical effects of thought suppression: a meta-analysis of controlled studies. *Clinical Psychology Review* 21 (5), 683-703.
- American Psychological Association, 2013. *Diagnostic and Statistical Manual of Mental Disorders*, 5th ed. APA, Washington, D.C.
- Arcelus, J., Mitchell, A.J., Wales, J., Nielsen, S., 2011. Mortality rates in patients with anorexia nervosa and other eating disorders. A meta-analysis of 36 studies. *Archives of General Psychiatry* 68 (7), 724-731.
- Arch, J.J., Eifert, G.H., Davies, C., Vilardaga, J., Rose, R.D., Craske, M.G., 2012. Randomized Clinical Trial of Cognitive Behavioral Therapy (CBT) Versus Acceptance and Commitment Therapy (ACT) for Mixed Anxiety Disorders. *Journal of Consulting and Clinical Psychology* 80 (5), 750-65.
- Attia, E., Roberto, C.A., 2009. Should amenorrhea be a diagnostic criterion for anorexia nervosa? *International Journal of Eating Disorders* 42 (7), 581-588.
- Beck, A.T., Steer, R.A., Ball, R., Ranieri, W.F., 1996. Comparison of Beck Depression Inventories–IA and –II in psychiatric outpatients. *Journal of Personality Assessment* 67 (3), 588-597.
- Berman, M.I., Boutelle, K.N., Crow, S.J., 2009. A case series investigating acceptance and commitment therapy as a treatment for previously treated, unremitted patients with anorexia nervosa. *European Eating Disorders Review* 17 (6), 426-434.
- Braams, B., Blechert, J., Boden, M., Gross, J.J., 2012. The effects of acceptance and suppression on anticipation and receipt of painful stimulation. *Journal of Behavior Therapy and Experimental Psychiatry* 43 (4), 1014-1018.

- Carter, J.C., Blackmore, E.E., Sutandar-Pinnock, K.K., Woodside, D.B., 2004. Relapse in anorexia nervosa: A survival analysis. *Psychological Medicine* 34 (4), 671-679.
- Cash, T.F., Phillips, K.A., Santos, M.T., Hrabosky, J.I., 2004. Measuring 'negative body image': Validation of the Body Image Disturbance Questionnaire in a nonclinical population. *Body Image* 1 (4), 363-372.
- Cohen, J., 1973. Eta-squared and partial eta-squared in fixed factor ANOVA designs. *Educational and Psychological Measurement* 33 (1), 107-112.
- Cramér, H., 1999. *Mathematical methods of statistics*. Princeton, Princeton University Press.
- de la Rie, S.M., Noordenbos, G.G., van Furth, E.F., 2005. Quality of life and eating disorders. *Quality of Life Research: An International Journal of Quality of Life Aspects of Treatment, Care & Rehabilitation* 14 (6), 1511-1522.
- Dufresne, R.G., Phillips, K.A., Vittorio, C.C., Wilkel, C.S., 2001. A screening questionnaire for body dysmorphic disorder in a cosmetic dermatologic surgery practice. *Dermatology and Surgery* 27 (5), 457-462.
- Eisen, J.L., Phillips, K.A., Baer, L., Beer, D.A., Atala, K.D., Rasmussen, S.A., 1998. The Brown Assessment of Beliefs Scale: reliability and validity. *American Journal of Psychiatry* 155 (1), 102-108.
- Fairburn, C.G., Cooper, Z., O'Connor, M.E., (2008). *Cognitive Behavior Therapy and Eating Disorders*. New York, Guilford Press.
- Faul, F., Erdfelder, E., Lang, A.-G., Buchner, A., 2007. G*Power 3: A flexible statistical power analysis program for the social, behavioral, and biomedical sciences. *Behavior Research Methods* 39, 175-191.

- First, M.B., Spitzer, R.L., Gibbon, M., Williams, J.B., 2002. Structured Clinical Interview for DSM-IV-TR Axis I Disorders. New York, Biometrics Research, New York State Psychiatric Institute.
- Greenberg, J.L., Wilhelm, S., 2011. Cognitive-behavioral therapy for body dysmorphic disorder: A review and future directions. *International Journal of Cognitive Therapy* 4 (4), 349-362.
- Grilo, C.M., Masheb, R.M., Lozano-Blanco, C., Barry, D.T., 2004. Reliability of the Eating Disorder Examination in Patients with Binge Eating Disorder. *International Journal of Eating Disorders* 35 (1), 80-85.
- Harris, R., 2009. ACT made simple. A quick-start guide to ACT basics and beyond. Oakland, New Harbinger Publications, Inc.
- Harris, P.A., Taylor, R., Thielke, R., Payne, J., Gonzalez, N., Conde, J.G., 2009. Research electronic data capture (REDCap) - A metadata-driven methodology and workflow process for providing translational research informatics support. *Journal of Biomedical Information* 42 (2), 377-381.
- Hartmann, A.S., Thomas, J.J., Wilson, A.C., Wilhelm, S., 2013. Delusionality in body image disorders: Insight and overvalued ideas in anorexia nervosa versus body dysmorphic disorder. *Psychiatry Research* 33 (5), 675-685.
- Hayes, S. C., Strosahl, K., Wilson, K., 2012. *Acceptance and Commitment Therapy: The Process and Practice of Mindful Change*, 2nd ed. New York, Guilford Press.
- Hayes, S.C., Strosahl, K., Wilson, K.G., 1999. *Acceptance and commitment therapy: An experimental approach to behavior change*. New York, Guilford Press.

- Heffner, M., Sperry, J., Eifert, G.H., Detweiler, M., 2002. Acceptance and commitment therapy in the treatment of an adolescent female with anorexia nervosa: A case example. *Cognitive and Behavioral Practice* 9 (3), 232-236.
- Hrabosky, J.I., Cash, T.F., Veale, D., Neziroglu, F., Soll, E.A., Garner, D.M., Strachan-Kinser, M., Clauss, L. J., Phillips, K. A., 2009. Multidimensional body image comparisons among patients with eating disorders, body dysmorphic disorder, and clinical controls: A multisite study. *Body Image* (3), 155-163.
- Holm, S., 1979. A simple sequentially rejective multiple test procedure. *Scandinavian Journal of Statistics* 6 (2), 65–70.
- Juarascio, A.S., Forman, E.M., Herbert, J.D., 2010. Acceptance and commitment therapy versus cognitive therapy for the treatment of comorbid eating pathology. *Behavior Modification* 34 (2), 175-190.
- Keel, P.K., Dorer, D.J., Franko, D.L., Jackson, S.C., Herzog, D.B., 2005. Postremission predictors of relapse in women with eating disorders. *American Journal of Psychiatry* 162 (12), 2263-2268.
- Kollei, I., Brunhoeber, S., Rauh, E., de Zwaan, M., Martin, A., 2012. Body image, emotions and thought control strategies in body dysmorphic disorder compared to eating disorders and healthy controls. *Journal of Psychosomatic Research* 72 (4), 321-327.
- Kollei, I., Martin, A., 2014. Body related cognitions, affect and post-event processing in body dysmorphic disorder. *Journal of Behavior Therapy and Experimental Psychiatry* 45 (1), 144-151.

- Konstantakopoulos, G., Varsou, E., Dikeos, D., Ioannidi, N., Gonidakis, F., Papadimitriou, G., Oulis, P., 2012. Delusional of body image beliefs in eating disorders. *Psychiatry Research* 200 (2-3), 482-488.
- Linehan, M.M., (1993). *Skills Training Manual for Treating Borderline Personality Disorder*, 1st ed. New York, The Guilford Press.
- Lobbestael, J., Leurgans, M., Arntz, A., 2011. Inter-rater reliability of the Structured Clinical Interview for DSM-IV Axis I disorders (SCID I) and Axis II disorders (SCID II). *Clinical Psychology & Psychotherapy*, 18 (1), 75-79.
- Luoma, J.B., Hayes, S.C., Walser, R., 2007. *Learning ACT: An acceptance and commitment therapy skills-training manual for therapists*. Oakland, CA, New Harbinger Publications.
- Marcks, B.A., Woods, D.W., 2005. A comparison of thought suppression to an acceptance-based technique in the management of personal intrusive thoughts: A controlled evaluation. *Behaviour Research and Therapy* 43 (4), 433-445.
- McKnight, R.F., Park, R.J., 2010. Atypical antipsychotics and anorexia nervosa: A review. *European Eating Disorders Review* 18 (1), 10-21.
- Moris, S.E., Cuthbert, B.N., 2012. Research Domain Criteria: cognitive systems, neural circuits, and dimensions of behavior. *Dialogues in Clinical Neuroscience* 14 (1), 29-37.
- Murphy, R., Straebl, S., Cooper, Z., Fairburn, C.G., 2010. Cognitive behavioral therapy for eating disorders. *Psychiatric Clinics of North America* 33 (3), 611-627.
- Najmi, S., Riemann, B. C., Wegner, D.M., 2009. Managing unwanted intrusive thoughts in obsessive-compulsive disorder: Relative effectiveness of

- suppression, focused distraction, and acceptance. *Behaviour Research and Therapy* 47 (6), 494-503.
- Pearson, A.N., Follette, V.M., Hayes, S.C., 2012. A pilot study of acceptance and commitment therapy as a workshop intervention for body dissatisfaction and disordered eating attitudes. *Cognitive and Behavioral Practice* 19, 181-197.
- Phillips, K.A., Albertini, R.S., Rasmussen, S.A., 2002. A randomized placebo-controlled trial of fluoxetine in body dysmorphic disorder. *Archives of General Psychiatry* 59 (4), 381-388.
- Phillips, K.A., Grant, J.E., Siniscalchi, J.M., Stout, R., Price, L.H., 2005. A retrospective follow-up study of body dysmorphic disorder. *Comprehensive Psychiatry*, 46 (5), 315-321.
- Phillips, K.A., Hollander, E., 2008. Treating body dysmorphic disorder with medication: Evidence, misconceptions, and a suggested approach. *Body Image* 5 (1), 13-27.
- Phillips, K. A., Hollander, E., Rasmussen, S.A., Aronowitz, B.R., 1997. A severity rating scale for body dysmorphic disorder: Development, reliability, and validity of a modified version of the Yale-Brown Obsessive Compulsive Scale. *Psychopharmacology Bulletin* 33 (1), 17-22.
- Phillips, K.A., Menard, W., Fay, C., Pagano, M.E., 2005. Psychosocial functioning and quality of life in body dysmorphic disorder. *Comprehensive Psychiatry* 46 (4), 254-260.
- Rosen, J.C., Ramirez, E., 1998. A comparison of eating disorders and body dysmorphic disorder on body image and psychological adjustment. *Journal of Psychosomatic Research* 44 (3-4), 441-449.

- Segal, Z.V., Williams, J.M.G., Teasdale, J.D., Kabat-Zinn, J., (2013). Mindfulness-based cognitive therapy for depression, 2nd ed. New York, The Guilford Press.
- Steinglass, J.E., Eisen, J.L., Attia, E., Mayer, L., Walsh, B., 2007. Is anorexia nervosa a delusional disorder? An assessment of eating beliefs in anorexia nervosa. *Journal of Psychiatric Practice* 13 (2), 65-71.
- Twohig, M.P., 2009. The application of acceptance and commitment therapy to obsessive-compulsive disorder. *Cognitive and Behavioral Practice* 16 (1), 18-28.
- Twohig, M.P., Hayes, S.C., Masuda, A., 2006. A preliminary investigation of acceptance and commitment therapy as a treatment for chronic skin picking. *Behaviour Research and Therapy* 44 (10), 1513-1522.
- Twohig, M.P., Hayes, S.C., Plumb, J.C., Pruitt, L.D., Collins, A.B., Hazlett-Stevens, H., Woidneck, M. R., 2010. A randomized clinical trial of acceptance and commitment therapy versus progressive relaxation training for obsessive-compulsive disorder. *Journal of Consulting and Clinical Psychology* 78 (5), 705-716.
- Velae, D., Gorunay, K., Dryden, W., Boocock, A., Shah, F., Willson, R., Walburn J., 1996. Body dysmorphic disorder: a cognitive behavioural model and pilot randomized controlled trial. *Behavior and Research Therapy* 34 (9), 717-729.
- Watson, D., Clark, L.A., Tellegen, A., 1988. Development and validation of brief measures of positive and negative affect: The PANAS scales. *Journal of Personality and Social Psychology* 54 (6), 1063-1070.
- Wetherell, J., Afari, N., Rutledge, T., Sorrell, J.T., Stoddard, J.A., Petkus, A.J., Solomon, B.C., Lehman, D.C., Liu, L., Lang, A.J., Atkinson, J., 2011. A

- randomized, controlled trial of acceptance and commitment therapy and cognitive-behavioral therapy for chronic pain. *Pain* 152 (9), 2098-2107.
- Wildes, J.E., Marcus, M. D., 2011. Development of emotion acceptance behavior therapy for anorexia nervosa: A case series. *International Journal of Eating Disorders* 44 (5), 421-427.
- Wilhelm, S., Phillips, K.A., Didie, E., Buhlmann, U., Greenberg, J.L., Fama, J.M., Keshaviah, A., Steketee, G., 2014. Efficacy of modular cognitive behavioral therapy for body dysmorphic disorder: A Randomized controlled trial. *Behavior Therapy* 45 (3), 314-27.
- Wilhelm, S., Phillips, K.A., Fama, J.M., Greenberg, J.L., Steketee, G., 2011. Modular cognitive-behavioral therapy for body dysmorphic disorder. *Behavior Therapy* 42 (4), 624-633.
- Wilhelm, S., Phillips, K.A., Steketee, G., 2013. *Cognitive Behavioral Therapy for Body Dysmorphic Disorder*. New York, The Guilford Press.

Figure captions

Figure 1.

Increase in positive affect from post baseline to post experimental condition depending on group and randomized strategy. Positive values denote greater gain in positive affect. Error bars denote ± 1 SE

Figure 2.

Note. Increase in acceptance for the thought from post baseline to post experimental condition depending on group and randomized strategy. Negative values denote greater gain in acceptance. Error bars denote ± 1 SE.

Table 1

Participants' demographic and clinical characteristics

	AN (<i>n</i> = 20)	BDD (<i>n</i> = 21)	HC (<i>n</i> = 22)	F(2,61) ¹	χ^2 df(2) ²
Age <i>M</i> (<i>SD</i>)	26.55 (11.05)	28.86 (12.70)	29.05 (10.70)	0.30	
Sex (female) <i>n</i> (%)	18 (90.00)	16 (76.19)	15 (68.18)		4.80
Race (Caucasian) <i>n</i> (%)	16 (80.00)	16 (76.19)	16 (72.73)		16.63
Ethnicity (non-hispanic) <i>n</i> (%)	20 (100)	21 (100)	21 (95.45)		2.04
Marital status (single) <i>n</i> (%)	19 (95.00)	17 (80.95)	17 (77.27)		6.87
Illness duration (years) <i>M</i> (<i>SD</i>)	9.60 (10.48)	13.53 (14.77)	--	0.94	
Main comorbid diagnoses <i>n</i> (%)					
OCD	7 (35.00)	2 (9.52)	--		4.19
Major depression	14 (70.00)	4 (19.00)	--		17.79***
Anxiety disorder ³	9 (45.00)	6 (28.57)	--		1.19
Body mass index (kg/m ²) <i>M</i> (<i>SD</i>)	16.75 (1.34) ^a	23.95 (5.08) ^b	24.80 (5.68) ^b	18.20***	
BDD Symptoms (BDD-YBOCS) <i>M</i> (<i>SD</i>) ⁴	32.20 (5.15) ^a	28.90 (3.91) ^b	0.95 (1.25) ^c	449.65***	

Eating Disorder Symptoms (EDE) <i>M (SD)</i>	3.72 (1.18) ^a	2.10 (1.46) ^b	0.26 (0.26) ^c	53.39***
Depressive Symptoms (BDI) <i>M (SD)</i>	34.70 (13.07) ^a	12.81 (10.51) ^b	2.09 (3.08) ^c	60.79***
Body Image Disturbance (BIDQ) <i>M (SD)</i>	3.44 (0.94) ^a	3.12 (0.59) ^a	1.14 (0.19) ^b	81.02***
Delusionalty (BABS) <i>M (SD)</i>	13.40 (5.82)	17.19 (4.46)	--	100.48***
Current atypical antipsychotics/SSRIs <i>n (%)</i>	14 (70.0)	8 (38.1)	--	7.04**

Note. BDD-YBOCS, Yale-Brown Obsessive-Compulsive Scale adapted for BDD (Phillips et al., 1997); EDE, Eating Disorder Examination (Fairburn et al., 2008); BDI, Beck Depression Inventory (Beck et al., 1996); BIDQ, Body Image Disturbance Questionnaire (Cash, 2008); BABS, Brown Assessment of Beliefs Scale (Eisen, et al., 1998); SRIs, Serotonin Reuptake Inhibitors.

¹ Degrees of freedom for duration of illness 1,40;

² Degrees of freedom for main comorbid diagnoses df=1

³ Diagnoses included panic disorder with and without agoraphobia, agoraphobia without panic, social anxiety disorder, specific phobia, generalized anxiety disorder, and anxiety not otherwise specified.

⁴ In the AN group, the BDD-YBOCS was conducted focusing on concerns regarding shape and weight.

^{a,b,c} Superscripts indicate significant post-hoc tests corrected for Bonferroni-Holm (Holm, 1979)

*** $p < .001$; ** $p < .01$; * $p < .05$

Table 2

Group Differences before and after baseline and experimental condition

	AN (<i>n</i> = 20)	BDD (<i>n</i> = 21)	HC (<i>n</i> = 22)	Test	Effect Size
	<i>M</i> (<i>SD</i>)	<i>M</i> (<i>SD</i>)	<i>M</i> (<i>SD</i>)	<i>F</i> (2,62)	$p\eta^2$
<i>Before Baseline Condition</i>					
PANAS Positive	22.10 (7.97) ^a	25.62 (5.10) ^a	30.41 (4.95) ^b	9.80***	0.25
PANAS Negative	31.35 (12.56) ^a	18.52 (8.55) ^b	11.18 (2.28) ^c	28.46***	0.49
<i>During Baseline Condition</i>					
Frequency of Thought Occurrence	16.75 (18.99) ^a	7.00 (5.42) ^b	1.82 (1.68) ^c	9.56***	0.24
<i>After Baseline Condition</i>					
PANAS Positive	19.95 (9.08) ^a	19.81 (5.05) ^a	27.09 (6.05) ^b	7.86**	0.21
PANAS Negative	31.50 (13.35) ^a	17.95 (8.11) ^b	10.59(1.44) ^c	29.55***	0.50
Appraisal Suppression	6.40 (2.28) ^a	5.95 (2.04) ^a	2.41 (1.50) ^b	26.80***	0.47
Appraisal Discomfort	7.30 (2.41) ^a	5.81 (2.36) ^a	1.64 (3.17) ^b	46.10***	0.61

<i>Appraisal</i> Acceptance of Thought	5.20 (3.17) ^a	5.14 (2.63) ^a	7.14 (2.27) ^b	3.79*	0.11
<i>Appraisal</i> Urge to do Something	7.40 (2.93) ^a	5.71 (2.94) ^a	2.45 (1.63) ^b	20.56***	0.41
<hr/>					
<i>During Experimental Condition</i>					
Frequency of Thought Occurrence	8.05 (8.33) ^a	4.86 (3.81) ^b	1.13 (0.83) ^c	9.30***	0.24
<hr/>					
<i>After Experimental Condition</i>					
<i>PANAS</i> Positive	26.30 (17.64)	23.14 (6.72)	24.68 (7.31)	0.39	0.01
<i>PANAS</i> Negative	32.05 (18.20) ^a	17.29 (8.33) ^b	10.55 (1.22) ^b	19.52***	0.35
<i>Appraisal</i> Suppression	6.82 (2.38) ^a	6.38 (2.62) ^a	2.14 (1.70) ^b	28.60***	0.50
<i>Appraisal</i> Discomfort	5.94 (2.97) ^a	5.57(2.42) ^a	1.64 (0.95) ^b	25.32***	0.47
<i>Appraisal</i> Acceptance of Thought	5.59 (2.94) ^a	4.33 (2.39) ^b	7.23 (2.67) ^a	6.53**	0.18
<i>Appraisal</i> Urge to do Something	6.88 (3.35) ^a	5.90 (2.49) ^a	2.23 (1.80) ^b	18.79***	0.40

Note. PANAS, Positive and Negative Affect Schedule (Watson et al., 1988); Appraisal, appraisal ratings according to Marcks and Woods, 2005

^{a,b,c} Superscripts indicate significant post-hoc tests corrected for Bonferroni-Holm (Holm, 1979)

*** $p < .001$; ** $p < .01$; * $p < .05$



