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Empirical Research

The application of a cognitive defusion technique to negative body image thoughts: A preliminary analogue investigation

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ABSTRACT

The purpose of the current analogue experiment was to investigate the impact of a cognitive defusion strategy, rapid vocal repetition, on self-identified negative body image thoughts. Undergraduate students ($N=254$) were randomized to one of five protocols: defusion condition with an experiential exercise for a self-identified negative body image thought, defusion without such an experiential exercise, distraction with an experiential exercise with the target thought, distraction without such an experiential exercise, and an experimental control task. At post-intervention, the defusion condition with an experiential exercise with the target negative body image thought showed significantly lower discomfort associated with that thought than distraction conditions and experimental control group, and this condition demonstrated greater decentering than the distraction condition without experiential exercise and the control group. The defusion condition with the experiential exercise with the target thought also demonstrated a greater reduction in believability than the other four conditions. Overall, our findings highlight the importance of including rapid vocation repetition of a target body image thought when trying to change the discomfort, believability, and decentering associated with that thought.

1. Introduction

In our weight- and appearance-focused society, negative body image thoughts are normative experiences for both women and men (Striegel-Moore et al., 2009). Clinically, how one responds to and relates to negative body image thoughts is crucial, as it can be associated with a range of mental health issues, such as disordered eating symptoms (Polivy & Herman, 2002; Striegel-Moore & Bulik, 2007) and depression (Wiederman & Pryor, 2000).

Coping strategies for body dissatisfaction generally aim to alter its *form* (content) and *frequency* (Cash, Santos, & Williams, 2005; Farrell, Shafran, & Lee, 2006; Wade, George, & Atkinson, 2009). For example, cognitive restructuring strategies are designed to change body dissatisfaction in these dimensions via highlighting positive physical features of the self and evaluating the costs of endorsing an unattainable ideal body image (Stice, Shaw, Burton, & Wade, 2006). Other cognitive behavioral approaches aim to identify irrational or maladaptive aspects of body image thoughts, challenge their veracity, and positively reframe them (Cash & Lavallee, 1997; Shafran, Farrell, Lee, & Fairburn, 2009). Among other techniques, distraction, the purposeful act of shifting attention away from a distressing event to another less emotionally distressing event or situation (Cohen, Cousins, & Martin, 2013; DeMore & Cohen, 2005; Gross, 2002), is found to be an effective strategy to cope with body dissatisfaction (Wade et al., 2009).

Although the effects of these strategies are encouraging, a growing body of evidence suggests that changing the content and occurrence of dysfunctional thoughts can be extremely challenging (Farrell et al., 2006; Vanderlinden, 2008) and even counterproductive (Onden-Lim & Grisham, 2013; Smart & Wegner, 1999; Wilson, Lindsey, & Schooler, 2000). Furthermore, recent behavioral models suggest that it is not necessary to modify body dissatisfaction thoughts in form or frequency for promoting greater psychological health (see Hayes, Villatte, Levin, & Hildebrandt, 2011).

1.1. Cognitive defusion

Cognitive defusion is the behavioral process of modifying the *stimulus functions* of a given private event by altering the situational and historical context where it occurs (Blackledge, 2007; Luoma & Hayes, 2008). Stimulus function in the present study refers to the emotion, cognition, and behavior regulatory role that

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[1] A copy of the complete intervention manual is available from the second author.

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a given private event has in a given context (Hayes & Wilson, 1995). The concept of cognitive defusion is derived from a contemporary behavioral theory of complex human behavior, called Relational Frame Theory (RFT; Hayes, Barnes-Holmes, & Roche, 2001), and its applied extension, Acceptance and Commitment Therapy (ACT; Hayes, Strosahl, & Wilson, 2012). A key tenet of RFT is that the stimulus functions of a given private event in a given moment are contextually determined, depending on the ongoing interaction of that private event with the historical and situational contexts in which it occurs (Anderson, Hawkins, & Scotti, 1997; Hayes & Brownstein, 1986; Hayes & Wilson, 1995). In ACT, therapeutic techniques, which are particularly designed to alter the stimulus functions of private events, are called cognitive defusion strategies (Luoma & Hayes, 2008).

A growing number of studies have demonstrated the positive effects of various cognitive defusion techniques (Healy et al., 2008; Hooper & McHugh, 2013; Levin, Hildebrandt, Lillis, & Hayes, 2012; Luciano et al., 2014). One of the most studied defusion strategies is rapid vocal repetition, which is often referred to as the "Milk–Milk–Milk" exercise (Hayes, Strosahl, et al., 2012, p. 248–250). In practice, the variations of this defusion exercise are used, depending on relevant, but slightly distinct purposes (Hayes, Strosahl, et al., 2012). For example, in some therapeutic contexts, a rapid vocal repetition exercise might consist of a clinical rationale (e.g., brief narration entailing behavior regulatory effects of difficult private events and the distinction between oneself and one's thoughts) and training (i.e., rapid vocal repetition of a neutral word, "milk") only. This form of rapid vocal repetition exercise appears to help the client become aware of a defused experience perhaps for the first time, and the stimulus functions of a specific thought are targeted somewhat indirectly. More specifically, following the clinical rationale and training, the defused experience with the neutral word (e.g., "milk") is framed hierarchically or in coordination with the targeted difficult thoughts (Blackledge, 2007; Hayes, Fox, et al., 2001).

In other occasions, the target thought to be defused is identified and the rapid vocal repetition is directly applied to that specific thought, following a clinical rationale and training with a neutral thought (Hayes, Strosahl, et al., 2012; Masuda, Feinstein, Wendell, & Sheehan, 2010). The aim of this form of defusion is to alter the stimulus functions of the target thought by directly altering the context where it occurs (Masuda, Feinstein, et al., 2010).

An important point to be highlighted here is that there are in fact variations of the Milk–Milk–Milk exercise that are used for different purposes, and that even the original ACT treatment manual (Hayes, Strosahl, et al., 2012) does not always require the rapid vocal repetition of a target thought to be part of the exercise. More specifically, in the original ACT manual, Hayes, Barnes-Holmes, and Wilson (2012a) simply noted that following the clinical rationale and rapid vocal repetition of a neutral word, "This exercise can also be done with a negative thought that is troubling a client if the thought can be shortened to a couple of words" (p. 249).

Research has shown that the rapid vocal repetition strategy, when delivered with all three components (i.e., clinical rationale, training with a neutral thought, and rapid vocal repetition of target thought), decreases discomfort and believability associated with a target thought (i.e., negative self-referential thought) more so than clinical rationale and training alone (Masuda, Hayes, Sackett, & Twohig, 2004; Masuda et al., 2009; Masuda, Feinstein, et al., 2010;) or a distraction strategy (Masuda, Feinstein, et al., 2010; Masuda, Twohig, et al., 2010). However, Masuda, Feinstein, et al. (2010) also reported that the defusion strategy with all three components was not equally effective across all participants, and that in some individuals, the clinical rationale and training (i.e., rapid vocal repletion of a neutral thought) only demonstrated effects comparable to the defusion condition with all three components.

1.2. Cognitive defusion and negative body image thought

In regards to the effects of cognitive defusion strategies on body dissatisfaction, evidence remains limited. For example, although body dissatisfaction was one of the most commonly self-identified thoughts in a previous defusion study (Masuda, Feinstein, et al., 2010), over 70% of participants in the study identified a negative self-referential thought unrelated to their own body dissatisfaction (e.g., "dumb"). One study (Deacon, Fawzy, Lickel, & Wolitzky-Taylor, 2011) examined the effects of rapid vocal repetition technique on the thought of *being fat* and its related negative self-referential thoughts (e.g., "lazy"). The defusion condition in the study consisted of the combination of all three components in addition to the completion of a homework exercise (i.e., defusion exercise) during the following week. Results demonstrated that the defusion condition produced substantial improvements in emotional discomfort, believability (i.e., perceived accuracy/truth of the thought), and perceived importance of not having the target thought of *being fat* at post-intervention. Additional improvement in the *perceived importance* of not having the thought of *being fat* was found at post-homework.

1.3. Decentering and cognitive defusion

In addition to emotional discomfort and believability, which have been studied extensively in previous defusion studies (De Young, Lavender, Washington, Looby, & Anderson, 2010; Masuda et al., 2004, 2009; Masuda, Twohig, et al., 2010; Watson, Burley, & Purdon, 2010), it is important to investigate the impact of rapid vocal repetition on the extent to which one experiences a target thought as simply a mental event rather than as oneself. In psychology literature, this functional aspect of private event is referred to as decentering (Feldman, Greeson, & Senville, 2010; McCracken, Gutiérrez-Martínez, & Smyth, 2013; Mennin, Ellard, Fresco, & Gross, 2013). Decentering, although varying in definition across investigators, is often defined as "the ability to observe one's thoughts and feelings as temporary, objective events in the mind, as opposed to reflections of the self that are necessarily true" (Fresco, Moore, et al., 2007, p. 234).

Decentering is particularly relevant to the present research context for three major reasons. First, the improvement in decentering is conceptualized to be a defining process of change in acceptance- and mindfulness-based interventions (Fresco, Segal, Buis, & Kennedy, 2007; Hayes et al., 2011; Mennin et al., 2013; Segal, Teasdale, & Williams, 2004), including ACT (McCracken et al., 2013). ACT aims to promote psychological flexibility, the ability to be open, present-focused, and aware and to change or persist in behavior when doing so serves one's values and goals (Hayes, Luoma, Bond, Masuda, & Lillis, 2006). Using the constructs of self-as-content, self-as-process, and self-as-construct, ACT highlights the significant role of decentering (e.g., looking at a thought, not looking from a thought, experiencing self as context where thoughts come and go) in the promotion of psychological flexibility. Additionally, the extant literature explicitly states a conceptual link between decentering and rapid vocal repetition exercises in ACT (Luoma & Hayes, 2008; Masuda et al., 2004; McCracken et al., 2013; Mennin et al., 2013), although its empirical link has not been fully investigated.

Second, previous defusion studies have not adequately measured decentering associated with a target thought, although the believability scale was designed to at least partially capture this functional aspect (Masuda et al., 2004; Masuda, Twohig, et al., 2010). For example, Masuda, Twohig, et al. (2010) pointed out the extreme likelihood that the believability scale measured how true or valid the *content* of the thought is, not the extent to which a given thought was experienced as a mental event. For the concerns raised by Masuda, Twohig, et al. (2010), Deacon et al. (2011) used the believability scale as a measure of accuracy or truth of the negative body image thought.

Finally, decentering seems to be a crucial stimulus dimension when psychosocial interventions target negative body image thoughts. According to pertinent evidence (Ahrberg, Trojca, Nasrawi, & Vocks, 2011; Watkins, Christie, & Chally, 2008; Weaver & Byers, 2006), changing the form or perceived accuracy of some negative body image thoughts are extremely challenging in part because these thoughts may reflect one's actual body shape/weight. For example, clinically obese individuals may strongly endorse the negative body image thought of "being obese", and challenging the validity of that thought may not be fruitful. As such, learning to view it as a mental event separated from oneself seems to be constructive, especially for increasing one's behavioral choices in its presence.

1.4. Present study

Extending previous findings, the present study had four major foci. The first aim was to examine the effect of rapid vocal repetition on a self-identified negative body image thought. Second, we examined the incremental effects of an experiential exercise with the target negative body image thought by comparing the defusion condition with only a clinical rationale and training (i.e., rapid vocal repetition of a neutral word). Third, the effects of this defusion condition were examined on measures of emotional discomfort, believability, and decentering associated with the target negative body image thought. Finally, to elucidate the relative effects of the cognitive defusion conditions, we compared the defusion strategies to a thought distraction strategy, a commonly employed strategy for body dissatisfaction (Wade et al., 2009), and an experimental control condition in the above mentioned functional aspects of the target body image thought.

Given these foci, the active intervention protocols (i.e., defusion and distraction conditions) were delivered with two different modes: (1) a brief clinical rationale and training (i.e., rapid vocal repetition of a neutral word, "milk"), and (2) an experiential rapid vocal repetition exercise with the *participant-identified* self-referential negative body image thought in addition to the clinical rationale and training. As evidence of cognitive defusion on negative body image thought is limited, our preliminary analogue experiment was largely exploratory. However, given previous findings (Deacon et al., 2011; Masuda, Feinstein, et al., 2010), we hypothesized that the cognitive defusion condition with the experiential exercise with a target body image thought would result in greater improvement in emotional discomfort, believability, and decentering associated with the target thought than the other four comparison conditions at post-intervention.

2. Method

2.1. Participants and settings

The study was conducted at a large public 4-year university in Georgia, United States. Students were recruited from undergraduate psychology courses through a web-based research participant pool where they voluntarily agreed to participate in "A study on the effects of coping styles for negative body image issues." Of the 259 students who agreed to participate, 254 individuals ($n_{female}=216$) completed the study. Five participants were excluded from the study because they could not identify a self-referential negative body image thought at the time of participation (see Thought Selection and Assessment Section below). The age of the final participant sample ranged from 16 to 55 years ($M=20.71$, $SD=5.26$). The ethnic composition of the sample was diverse with 51% ($n=131$) identifying as "African American," 19% ($n=48$) as "Non-Hispanic European American," 13% ($n=33$) as "Asian American," 9% ($n=22$) as "Hispanic American," 8% ($n=19$) as "other" or "bicultural," and one participant providing no response to the ethnic background query.

2.2. Experimental design

Using a simple randomization procedure (Altman & Bland, 1999), participants were randomly assigned to one of the five conditions: Partial-Defusion, Full-Defusion, Partial-Distraction, Full-Distraction, and experimental control. The partial conditions consisted of a brief clinical rationale and a condition-specific training using a neutral word. The full conditions included a condition specific experiential exercise with the participant-identified negative body image thought, following a clinical rationale and a condition-specific training with a neutral word.

The primary outcome variables were emotional discomfort, believability, and decentering associated with a self-identified negative body image thought measured at pre- and post-intervention points. Participation was completed in one session lasting approximately 30 min, during which the participant completed the consent procedure, assessment, and intervention. Consistent with a previous cognitive defusion study (Masuda, Feinstein, et al., 2010), all experimental procedures were closely scripted and administered by five research investigators who were trained and monitored by the second author (A.M.). In order to control experimenter effects, all research investigators conducted all of the five conditions.

2.3. Measures

Prior to randomization to intervention conditions, participants completed questionnaires assessing demographics (i.e., gender, age, ethnicity), body image flexibility, and disordered eating symptoms. The scores of these questionnaires were used to identify participants' pre-intervention characteristics.

2.3.1. Body image flexibility

The Body Image-Acceptance and Action Questionnaire (BI-AAQ; Sandoz, Wilson, Merwin, & Kellum, 2013) is a 12-item scale designed to measure psychological flexibility in the context of body dissatisfaction. Individuals rate the degree to which each statement (e.g., "Worrying about my body takes up too much of my time") applies to them using a 7-point Likert-like scale, ranging from 1 (*never true*) to 7 (*always true*). All items are reverse scored so that higher scores on this measure indicate greater body image acceptance and flexibility. Possible overall scores range from 7 to 84. In the present study, the scale demonstrated strong internal consistency with a Cronbach's alpha of 0.94.

2.3.2. Eating disorder symptoms

The Eating Attitudes Test (EAT-26; Garner, Olmsted, Bohr, & Garfinkel, 1982) is a self-report inventory that measures general eating disorder pathology (e.g., "I am terrified about being overweight" and "I vomit after I have eaten"). Each of the 26 items is scored on a 6-point Likert scale: *never* (0), *rarely* (0), *sometimes* (0), *often* (1), *very often* (2), or *always* (3), except for item 26, which is scored *never* (3), *rarely* (2), *sometimes* (1), *often* (0), *very often* (0), or *always* (0). The total score ranges from 0 to 78, with higher scores reflecting greater eating disorder symptomatology. In a previous study conducted with a non-clinical sample of college students (Masuda, Boone, & Timko, 2011), Cronbach's alpha coefficient for the measure was 0.85. In the current study, Cronbach's alpha was also 0.85.

2.3.3. Usefulness

Immediately after the post-assessment of outcome variables, the participant rated the assigned strategy in terms of effectiveness, feasibility (e.g., "easy to use"), intention to use in the future, and likelihood to recommend the strategy to others using a 7-point scale, ranging from 1 (*strongly disagree*) to 7 (*strongly agree*).

2.4. Procedure

2.4.1. Thought selection and assessment

Following the completion of self-report measures, participants were instructed to identify one self-referential body dissatisfaction thought that they had found very uncomfortable (e.g., "I'm ugly"), and then asked to restate it in one word (e.g., "ugly"). Subsequently, they rated the thought in terms of emotional discomfort, believability, and decentering (i.e., the degree to which one identifies with that thought) using 100-point visual analog scales (VASs). Responses ranged from 0 (*not at all uncomfortable*) to 100 (*very uncomfortable*) for the discomfort scale, 0 (*not at all believable*) to 100 (*very believable*) for believability, and 0 (*the thought is just a thought; it is not who I am*) to 100 (*the thought is who I am; it is me*) for decentering. We administered the VASs immediately before and after the intervention.

2.4.2. Intervention

The intervention procedure was approximately 5 min. Intervention conditions were drawn from a previous defusion study (Masuda, Feinstein, et al., 2010) and closely scripted. The defusion and distraction conditions in each mode of delivery (i.e., partial and full) were designed to be equal in terms of (a) components, (b) duration, (c) sequence of components, and (d) contents of training (e.g., the use of the word "milk" highlighting the use of the assigned strategy). For the present study, we modified the contents for protocols tailored to the issues relevant to body dissatisfaction.

In the Partial-Defusion condition, the clinical rationale included the benefits and costs of human verbal processes in the context of problem solving, as well as the automatic and contextual nature of verbal processes, including body dissatisfaction thoughts. The defusion training involved the rapid vocal repetition with the word "milk" (Hayes, Strosahl, et al., 2012, p. 248–250). After the training, participants typically reported a loss of meaning attached to the word, and they noted that the more direct functions of the word appeared (e.g., "The word became just a sound."). The Full-Defusion condition included the same clinical rationale and training followed by an experiential exercise (e.g., the rapid vocal repetition of a one-word version of the self-identified target thought for 30 s with prompts to go "faster" and "louder" every 10 s).

In the Partial-Distraction condition, the rationale highlighted a distracting strategy as a conventional way of coping with difficult thoughts and feelings. In the training component, we instructed participants not to think of the word "milk" by focusing on a picture of simple geometric figures presented to them for 20 s with prompts every 5 s to "only focus on that picture". The Full-Distraction condition included a rationale and training followed by an experiential distraction-based exercise of not thinking of the self-identified target body dissatisfaction thought by focusing on the picture of geometric shapes for 30 s with prompts to think of that picture every 10 s.

The experimental control condition (i.e., control condition) did not include clinical rationale, training, or experiential exercise with the target thought. Instead, we asked the participant in the condition to read an article about the growth of trees for 5 min. The experimental control condition was added to the study in order to control non-specific factors.

2.5. Analytic strategies

The results for the emotional discomfort, believability, and decentering scores were analyzed separately, using three 5 (condition) by 2 (time) repeated measure ANOVAs while controlling for age, gender, eating disorder symptoms, and body image flexibility. A significant condition by time interaction effect was investigated further by examining the effects of time within each condition and the effects of condition at post-intervention. More specifically, a paired-samples *t*-test was used to investigate the effect of time on a given dependent variable (e.g., discomfort) for each condition (e.g., Full-Defusion condition). Consistent with a previous analogue investigation (Kohl, Rief, & Glombiewski, 2013), analysis of covariance (ANCOVA) was used to investigate the effects of each condition at post-intervention with the condition as the independent variable and post-intervention scores as the dependent variables, while co-varying for pre-intervention scores, age, gender, body image flexibility, and disordered eating pathology.

3. Results

3.1. Pre-intervention characteristics

Participant characteristics, and means and standard deviations for pre-intervention and post-intervention scores by intervention condition are presented in Table 1. The BI-AAQ and EAT-26 scores revealed that the present sample was comparable to nonclinical samples in previous studies at the level of body image flexibility (Sandoz et al., 2013) and eating disorder pathology (Masuda et al., 2011). Results of Chi-Square tests revealed that intervention conditions did not differ by gender ($\chi^2 = 5.12$, $p > 0.27$) or ethnicity ($\chi^2 = 13.35$, $p > 0.86$). A series of ANOVAs revealed that the intervention conditions also did not differ in age, body image flexibility, or eating disorder pathology. A separate series of ANOVAs revealed that the intervention conditions did not differ in pre-intervention

Table 1
Participant characteristics and means and standard deviations of outcome variables at pre-intervention and post-intervention by intervention condition.

	Full Defusion ($n=57$)	Partial Defusion ($n=54$)	Full Distraction ($n=60$)	Partial Distraction ($n=38$)	Control ($n=45$)	Total ($N=254$)
Body image flexibility	63.72 (16.68)	66.09 (15.31)	70.20 (13.15)	67.79 (14.60)	68.96 (14.78)	67.29 (15.03)
Eating disorder pathology	8.63 (8.38)	8.32 (9.66)	6.15 (6.09)	4.89 (4.89)	7.52 (8.98)	7.23 (7.93)
Discomfort						
Pre-intervention	63.91 (23.42)	58.33 (22.73)	52.78 (26.27)	59.99 (29.11)	54.29 (24.84)	57.80 (25.28)
Post-intervention	34.21 (29.93)	37.76 (25.57)	38.75 (25.26)	45.13 (30.72)	41.72 (25.38)	39.00 (27.32)
Pre–Post within *d*	2.17	1.61	1.33	1.50	1.02	
Believability						
Pre-intervention	76.08 (22.14)	69.11 (24.78)	69.23 (25.12)	66.88 (27.69)	62.14 (28.03)	69.14 (25.56)
Post-intervention	36.59 (28.66)	48.02 (27.52)	52.95 (26.88)	48.07 (30.04)	50.21 (31.43)	47.02 (29.11)
Pre–Post within *d*	2.66	1.47	1.21	1.71	1.00	
Decentering						
Pre-intervention	47.58 (29.80)	40.98 (27.37)	42.54 (29.91)	39.95 (29.47)	37.98 (30.82)	42.14 (29.41)
Post-intervention	26.83 (27.23)	25.33 (23.23)	30.99 (25.91)	35.16 (29.76)	32.16 (26.01)	29.72 (26.33)
Pre–Post within *d*	1.50	1.49	1.18	0.46	0.69	

Table 2
Zero-order relations between all variables at pre-intervention.

	1	2	3	4	5	6
1. Emotional discomfort	–					
2. Believability	0.38**	–				
3. Decentering	0.28**	0.45**	–			
4. Age	0.16*	0.08	−0.04	–		
5. Gender	−0.11	0.01	0.08	0.09	–	
6. Eating disorder pathology (EAT-26)	0.38**	0.19**	0.27**	0.12	−0.06*	–
7. Body image flexibility (BI-AAQ)	−0.46	−0.27**	−0.29**	−0.04	0.12	−0.67**

Note: $N=253$. EAT-26=Eating Attitudes Test-26; BI-AAQ=Body Image-Acceptance and Action Questionnaire.

* $p<0.05$.

** $p<0.01$.

Table 3
Marginal means and standard errors of outcome variables at post-intervention co-varied with age, gender, body image flexibility, eating pathology, and pre-intervention scores by intervention condition and between-condition effect size.

	Discomfort	Believability	Decentering
Full-Defusion ($n=57$)	30.29[a] (2.92)	32.41[b] (3.30)	23.74[c] (2.48)
Partial-Defusion ($n=54$)	36.97[a] (3.01)	47.21[b] (3.39)	25.41[c] (2.55)
Full-Distraction ($n=60$)	41.99[a] (2.86)	52.95[b] (3.22)	30.09[c] (2.42)
Partial Distraction ($n=38$)	45.99[a] (3.69)	51.19[b] (4.15)	36.84[c] (3.13)
Control ($n=45$)	43.47[a] (3.31)	55.27[b] (3.75)	34.88[c] (2.81)
Between condition Cohen's *d*			
Full-Defusion vs. Partial-Defusion	−0.31	−0.60	−0.09
Full-Defusion vs. Full-Distraction	−0.53	−0.83	−0.34
Full-Defusion vs. Partial-Distraction	−0.78	−0.72	−0.71
Full-Defusion vs. Control	−0.62	−0.93	−0.60
Partial-Defusion vs. Full-Distraction	−0.23	−0.23	−0.25
Partial-Defusion vs. Partial-Distraction	−0.42	−0.12	−0.62
Partial-Defusion vs. Control	−0.29	−0.33	−0.51
Full-Distraction vs. Partial-Distraction	−0.18	−0.11	−0.36
Full-Distraction vs. Control	−0.07	−0.09	−0.26
Partial-Distraction vs. Control	0.12	−0.21	0.11

Standard errors in parentheses.

[a] Covariates are evaluated at the following values: Age=20.73, Gender=1.14, Body Image Acceptance and Action Questionnaire (BI-AAQ)=28.92, Eating Attitude Test-26 (EAT-26)=7.24, and Pre-intervention Discomfort=58.14.

[b] Covariates are evaluated at the following values: Age=20.73, Gender=1.14, BIAAQ=28.92, EAT-26=7.24, and Pre-intervention Believability=69.27.

[c] Covariates are evaluated at the following values: Age=20.73, Gender=1.14, BIAAQ=28.92, EAT-26=7.24, and Pre-intervention Decentering=42.07.

emotional discomfort, believability, or decentering ($Fs<1.93$, $ps>0.10$).

The thought assessment of 254 participants yielded 65 distinct one-word versions of negative body image thoughts. Given great variability, we systematically grouped these thoughts into five clusters based on their shared themes and characteristics. These clusters were (a) size, (b) emotional reactions/negative judgments, (c) desired actions/characteristics, (d) specific features unrelated to weight, and (e) symbolic/abstract. Following the cluster system, over 54% ($n=139$) of participants were found to rephrase their negative body image thoughts into size-related (i.e., weight or height-related) single words, such as "fat," "heavy," and "skinny." Approximately 27% of participants ($n=68$) converted their negative body image thoughts into single words highlighting a negative emotional reaction or negative judgment, such as "annoying," "gross," and "insecure." About 9% ($n=23$) rephrased their thoughts into single words that identified specific features or body parts, such as "abs" and "feet," followed by 5 % ($n=14$) endorsing a symbolic word (e.g., "apple," "bubble") and 5% ($n=12$) endorsing single words reflecting desired actions or characteristics (e.g., "dedication," "exercise").

Table 2 shows zero-order correlations among study variables at pre-intervention. Results revealed that 14% and 8% of the variance of emotional discomfort were shared with believability and decentering, respectively. Findings also revealed that 20% of the variance of believability was shared with decentering. These findings suggested that emotional discomfort, believability and decentering are related, but distinct stimulus functions of the target thought. Additionally, both eating disorder pathology and body image flexibility were significantly associated with discomfort, believability, and decentering in expected directions.

3.2. Effects on self-referential negative body image thoughts

3.2.1. Emotional discomfort

For emotional discomfort, a repeated-measure ANOVA showed a condition × time interaction, $F(4, 241)=4.16$, $p<0.01$. Paired samples *t* tests revealed that post-intervention discomfort was significantly lower than pre-intervention discomfort in all conditions. Regarding between condition difference at post-intervention, results of ANCOVA revealed a main effect of condition, $F(4, 240)=3.93$, $p<0.01$. Subsequent pairwise comparisons revealed that the Full-Defusion group reported significantly lower levels of emotional discomfort than the Full-Distraction, Partial-Distraction, or Control conditions ($ps<0.05$). No other significant group differences were found at post-intervention ($ps>0.05$).

Similarly, effect size analyses using the marginal means and standard errors revealed a small to medium effect in comparisons between the Full-Defusion condition and the other four comparison conditions (see Table 3). A small effect size difference was observed between the Partial-Defusion condition and the remaining three conditions.

3.2.2. Believability

Results revealed a main effect for time, $F(1, 241)=7.03$, $p<0.01$, and a condition × time interaction, $F(4, 241)=8.21$, $p<0.001$ in believability. Paired samples t tests revealed that post-intervention believability was significantly lower than pre-intervention believability in all conditions. Following the ANCOVA revealing the main effect of condition at post-intervention, $F(4, 240)=6.99$, $p<0.001$, the results of pairwise comparisons showed the Full-Defusion group had significantly lower believability than the other four groups ($ps<0.05$). No other significant group differences were observed at post-intervention ($ps>0.05$).

Effect size analyses also revealed medium to large effects in comparisons between the Full-Defusion and the other four conditions. A small effect was observed in comparisons between the Partial-Defusion and the Full-Distraction, the Partial-Defusion and the experimental control, and the Partial-Distraction and the experimental control conditions.

3.2.3. Decentering

In regard to decentering, results revealed a main effect for time, $F(1, 241)=6.42$, $p<0.05$, and a two way interaction between condition and time, $F(4, 241)=3.98$, $p<0.01$. Paired samples t tests revealed that post-intervention decentering was significantly greater than pre-intervention decentering in all conditions, except the Partial-Distraction condition. Results of ANCOVA revealed a main effect of condition at post-intervention, $F(4, 240)=4.29$, $p<0.01$, along with pairwise comparisons showing that the Full-Defusion condition reported significantly greater decentering than the Partial-Distraction and control conditions ($ps<0.05$). No other condition differences were observed at post-intervention ($ps>0.05$).

Effect size analyses revealed small to medium effects in comparisons between the Full-Defusion condition and the other comparison conditions, except the Partial-Defusion. There were small to medium effects between the Partial-Defusion and the remaining three conditions. A small effect was observed between the Full-Distraction and the Partial-Distraction and between the Full-Distraction and experimental control conditions.

3.3. Exploratory analyses on individuals with elevated negative body image thoughts

Previous defusion studies set the inclusion criteria for the minimum levels of emotional discomfort and believability to be 50 or above in the 100-point VASs (Masuda, Feinstein, et al., 2010; Masuda, Twohig, et al., 2010). Following their criteria in addition to the minimum level of decentering scale to be 50 or above, 80 participants (women=68) were selected as individuals with elevated self-referential negative body image thought. The age of this subsample ranged from 18 to 47 years ($M=20.79$, $SD=4.49$). The ethnic composition of the sample included 38% African Americans ($n=30$), 28% Non-Hispanic European Americans ($n=23$), 14% Asian Americans ($n=11$), 10% Hispanic Americans ($n=8$), and 10% other or bicultural ($n=8$).

Table 4 shows the sample characteristics and descriptive statistics, organized by intervention condition, for pre-intervention and post-intervention discomfort, believability, and decentering in individuals with elevated negative body image thought. A series of ANOVAs revealed that the intervention conditions did not differ in age, body image flexibility, or the outcome variables of interest (i.e., emotional discomfort, believability, decentering) at pre-intervention ($Fs<1.93$, $ps>0.10$). However, the main effect of intervention was found in pre-intervention eating disorder pathology. Pairwise comparisons revealed that the Partial-Distraction Condition had significantly lower eating disorder pathology than the control group ($p<0.05$).

Table 5 shows zero-order correlations among study variables at pre-intervention. Results revealed that emotional discomfort was significantly and positively associated with believability and that believability was significantly and positively related to decentering. Both eating disorder pathology and body image flexibility were significantly associated with discomfort, believability, and decentering in expected directions.

3.3.1. Emotional discomfort

A repeated-measure ANOVA indicated a significant main effect of time, $F(1, 71)=15.05$, $p<0.01$, but not a condition × time interaction, $F(4, 71)=0.97$, $p=0.43$. Paired samples t tests revealed that post-intervention discomfort was significantly lower than pre-intervention discomfort in all conditions. Results of the ANCOVA showed the absence of a significant main effect of condition in post-intervention emotional discomfort, $F(4, 70)=0.77$, $p=0.55$.

3.3.2. Believability

Results of the repeated measure ANOVA did not show a main effect for time, $F(1, 71)=2.91$, $p=0.09$, or a condition × time interaction, $F(4, 71)=2.25$, $p=0.07$ in believability. Similarly, the ANCOVA did not show the main effect of condition at post-intervention, $F(4, 70)=2.04$, $p=0.099$. Results of least significant difference (LSD) pairwise comparisons indicated that the Full-Defusion group had significantly lower believability than the Full-Distraction and control conditions ($ps<0.05$) at post-intervention. No other condition differences were observed at post-intervention ($ps>0.05$).

3.3.3. Decentering

Results of a repeated measure ANOVA revealed a main effect for time, $F(1, 71)=4.26$, $p<0.05$, but not a two way interaction between condition and time, $F(4, 71)=1.97$, $p=0.11$. Results of the ANCOVA did not show a main effect of condition at post-intervention, $F(4, 70)=2.31$, $p=0.07$. Subsequent pairwise comparisons with LSD showed that both Full-Defusion and Partial-Defusion conditions reported significantly greater decentering than the control condition ($ps<0.05$). No other condition differences were observed at post-intervention ($ps>0.05$).

3.4. Usefulness measures

A series of ANOVAs showed main effects of the intervention on perceived effectiveness, willingness to use in the future, and recommending others to use the assigned strategy ($Fs>3.70$, $ps<0.01$). There was no main effect of condition in feasibility to use the assigned strategy, $F(4, 247)=1.81$, $p>0.05$. In the effectiveness rating, Partial-Defusion, Full-Defusion, and Partial-Distraction conditions were rated more effective than the control condition ($ps<0.05$). With respect to willingness to use the assigned strategy, the Full-Defusion and Full-Distraction conditions showed greater willingness than the control condition ($p<0.01$). Finally, in regards to recommending the assigned strategy to others, the Full-Defusion and Full-Distraction conditions showed greater scores than the control condition ($ps<0.05$) (Table 6).

4. Discussion

The present analogue experiment investigated the application of a rapid vocal repetition strategy to a self-identified, negative self-referential body image thought by examining its effects on

Table 4
Participant characteristics and means and standard deviations of outcome variables at pre-intervention and post-intervention by intervention condition in subsample of individuals with elevated negative body image thought.

	Full Defusion ($n=23$)	Partial Defusion ($n=14$)	Full Distraction ($n=19$)	Partial Distraction ($n=13$)	Control ($n=11$)	Total ($N=80$)
Body image flexibility	55.52 (19.16)	58.42 (17.58)	67.68 (16.61)	65.00 (16.18)	54.18 (19.42)	60.28 (18.24)
Eating disorder pathology	12.52 (9.55)	12.21 (12.97)	6.84 (7.54)	5.23 (4.21)	16.91(13.28)	10.54 (10.31)
Discomfort						
Pre-intervention	79.29 (14.62)	70.26 (11.13)	69.20 (11.71)	71.74 (14.23)	76.48 (24.84)	73.70 (13.84)
Post-intervention	53.09 (27.05)	56.69 (22.75)	50.10 (20.03)	58.95 (25.19)	57.29 (25.38)	54.54 (23.47)
Pre–Post within *d*	1.06	0.66	0.53	0.69	0.61	
Believability						
Pre-intervention	86.96 (10.78)	83.82 (10.70)	82.49 (13.08)	82.13 (14.25)	86.62 (28.03)	84.52 (12.13)
Post-intervention	49.77 (30.22)	55.77 (24.05)	67.48 (19.82)	61.53 (26.95)	69.93 (31.43)	59.71 (26.76)
Pre–Post within *d*	1.37	1.24	1.07	0.92	0.85	
Decentering						
Pre-intervention	75.46 (18.26)	68.58 (13.81)	72.27 (13.82)	69.38 (16.45)	77.05 (30.82)	72.73 (15.70)
Post-intervention	42.45 (27.01)	38.43 (19.84)	48.86 (22.68)	56.14 (21.73)	62.89 (26.01)	48.30 (23.87)
Pre–Post within *d*	1.08	0.72	1.11	0.70	0.63	

Table 5
Zero-order relations between all variables at pre-intervention in individuals with elevated negative body image thought.

	1	2	3	4	5	6
1. Emotional discomfort	–					
2. Believability	0.33**	–				
3. Decentering	0.19	0.40**	–			
4. Age	−0.00	0.08	−0.04	–		
5. Gender	−0.05	0.05	−0.15	0.10	–	
6. Eating disorder pathology (EAT-26)	0.46**	0.02	0.07	0.09	−0.11	–
7. Body image flexibility (BI-AAQ)	−0.53**	−0.04	−0.04	0.08	0.16	−0.66**

Note: $N=80$, *$p < 0.5$, **$p < 0.1$, EAT-26=Eating Attitudes Test-26; BI-AAQ=Body Image-Acceptance and Action Questionnaire.

associated emotional discomfort, believability, and decentering. Within this experimental paradigm, we also investigated the additive effect of an experiential exercise with the target thought within the defusion strategy, as well as the effects of these defusion conditions relative to distraction and experimental control conditions.

The findings partially support our hypotheses, and suggest several conceptual and applied implications. A first implication is the potential applicability of rapid vocal repetition with a given self-referential negative body image thought, especially when delivered along with a clinical rationale, training with a neutral word, and an experiential exercise with the target thought (i.e., Full-Defusion condition). Controlling for age, gender, body image flexibility, and eating disorder pathology, the Full-Defusion condition reduced emotional discomfort and believability associated with the self-identified negative body image thought, and promoted decentering from that thought at post-intervention. The favorable effects of the Full-Defusion condition are generally greater than distraction and control conditions, except no significant difference were found with the Full-Distraction condition on the measure of decentering. The benefit of a Full-Defusion condition has been well documented (Levin et al., 2012; Masuda et al., 2009; Masuda, Feinstein, et al., 2010), and the present study has extended the literature by replicating Deacon et al. (2011) and highlighting the immediate effects of rapid vocal repetition to negative body image thought.

A second implication is that the incremental effect of the experiential exercise with the target negative body image thought within the defusion strategy depends on the types of stimulus function associated with that thought. More specifically, believability associated with the target thought seems to decrease greatly when the rapid vocal repetition of that thought is added to the defusion protocol. However, the rapid repetition of target thought is less likely to add incremental effects in emotional discomfort and decentering. As noted elsewhere (Masuda et al., 2009), these differential findings may suggest that these three stimulus dimensions reflects distinct functional and relational aspects of negative body image thoughts, and that changes in these stimulus functions may require different defusion processes. According to Blackledge (2007) there are in fact several related but distinct defusion processes. The present findings suggest that, for changing emotional discomfort and decentering associated with a target negative body image thought, directly intervening with a neutral thought and framing it hierarchically or in coordination with the target thought may be sufficient. However, following the clinical rationale and training, the rapid vocal repetition may need to be directly applied to the target thought for achieving optimal reduction in believability. Given the preliminary nature of the present study, these findings need to be replicated and future studies should investigate whether and how discomfort, believability and decentering associated with a negative body image thought are functionally distinct and how these stimulus dimensions are altered.

A third implication is that pre-intervention levels of outcome measures may moderate the effects of the rapid vocal repetition strategy. This implication is derived from the results of the subsample who endorsed greater body image thought in discomfort, believability, and decentering. More specifically, unlike previous studies (Masuda, Feinstein, et al., 2010; Masuda, Twohig, et al., 2010), this subsample did not demonstrate the significant superiority of Full-Defusion condition over other comparison conditions. The absence of superiority of Full-Defusion condition may be due to a smaller sample size, but the current analytic strategies do not

Table 6
Marginal means and standard errors of outcome variables at post-intervention by intervention condition and between-condition effect size in individuals with elevated negative body image thought.

	Discomfort	Believability	Decentering
Full-Defusion ($n=23$)	50.84[a] (4.76)	48.04[b] (5.33)	41.84[c] (4.82)
Partial-Defusion ($n=14$)	58.80[a] (6.08)	57.35[b] (6.79)	40.85[c] (6.23)
Full-Distraction ($n=19$)	51.43[a] (5.44)	67.91[b] (6.16)	47.62[c] (5.57)
Partial Distraction ($n=13$)	62.20[a] (6.31)	63.66[b] (7.15)	57.62[c] (6.48)
Control ($n=11$)	53.19[a] (6.99)	68.29[b] (7.92)	61.48[c] (7.19)
Between Condition Cohen's *d*			
Full-Defusion vs. Partial-Defusion	−0.36	−0.38	0.04
Full-Defusion vs. Full-Distraction	−0.03	−0.78	−0.25
Full-Defusion vs. Partial-Distraction	−0.51	−0.63	−0.70
Full-Defusion vs. Control	−0.11	−0.81	−0.87
Partial-Defusion vs. Full-Distraction	0.32	−0.41	−0.29
Partial-Defusion vs. Partial-Distraction	−0.16	−0.26	−0.75
Partial-Defusion vs. Control	0.26	−0.44	−0.91
Full-Distraction vs. Partial-Distraction	−0.48	0.17	−0.43
Full-Distraction vs. Control	−0.07	−0.01	−0.59
Partial-Distraction vs. Control	0.41	−0.19	−0.17

Standard errors in parentheses.

[a] Covariates are evaluated at the following values: Age=20.79, Gender=1.15, Body Image Acceptance and Action Questionnaire (BI-AAQ)=60.28, Eating Attitude Test-26 (EAT-26)=10.54, and Pre-intervention Discomfort=73.70.

[b] Covariates are evaluated at the following values: Age=20.79, Gender=1.15, BI-AAQ=60.28, EAT-26=10.54, and Pre-intervention Believability=84.52.

[c] Covariates are evaluated at the following values: Age=20.79, Gender=1.15, BI-AAQ=60.28, EAT-26=10.54, and Pre-intervention Decentering=72.73.

allow investigating the potential moderating roles of pre-intervention outcome measures fully. We used these analytic strategies in order to make the comparisons with previous defusion studies (Masuda, Feinstein, et al., 2010; Masuda, Twohig, et al., 2010) possible. Given this emerging implication, future studies may use a different analytic method, perhaps treating pre-intervention levels of outcome variables as well as individual difference variables (e.g., body image flexibility) as predictors, not as covariates, and investigate how these factors interact with the intervention conditions on post-intervention outcome variables.

Fourth, yet another direction for future studies is to investigate whether the defusion strategy is qualitatively distinct from other strategies, such as cognitive dissonance and distraction as well as from other acceptance- and mindfulness-based strategies (i.e., nonjudgmental observation of body dissatisfaction). Although previous researchers have found acceptance- and mindfulness-based strategies to be as effective in reducing body dissatisfaction as cognitive dissonance and distraction strategies (Atkinson & Wade, 2012; Wade et al., 2009), it remains somewhat unclear whether these favorable outcomes are due to distinct processes of change (Mennin et al., 2013). Furthermore, the present findings suggest that the differences between the defusion and distraction conditions are quantitative, not qualitative.

On a related note, the distraction conditions in the present study were found to be only slightly more effective or no more effective than the experimental control condition. This set of findings is somewhat surprising as a previous analogue experiment on body dissatisfaction (Wade et al., 2009) shows that the distraction strategy is as effective as acceptance and cognitive dissonance strategy in improving weight satisfaction as well as appearance satisfaction. Although the exact nature of these effects is unclear, the differences may be in part due to methodological variability between the two studies. In Wade et al (2009), the participants in the distraction condition were allowed to freely select the stimulus event used for distraction. Given the procedure, the participants might have been able to engage in a distraction strategy that was already in their behavioral repertoire. Conversely, the stimulus used for the present distraction (i.e., a picture of geometric figures) was standardized to increase the within-group consistency. As one of the previous defusion studies noted (Masuda, Feinstein, et al., 2010), it is possible to speculate that the standardization of stimulus event used for distraction in the present study might have hindered the ecological and practical value of the strategy.

Finally, consistent with Masuda, Feinstein et al. (2010), much greater variability (*SD*s) of outcome variables in the subsample of individuals with elevated negative body image thought is seen at post-intervention, relative to those at pre-intervention. These findings show larger inter-individual differences at post-intervention, suggesting the varying effects of interventions across participants. In addition to the functional aspects of target thought at pre-intervention, it is important to continue to investigate other potential factors that may account for the variability. Potential candidates may include the content of body image thought, body mass index, cognitive flexibility, existing repertoire of cognitive defusion and associated processes, and demand characteristics.

The present study has several limitations. First, given the present research sample, the examined findings do not demonstrate whether the rapid vocal repetition strategy is effective for a clinical population, nor does it provide evidence that the defusion procedure is better than existing clinical methods. Based on the clinical cut off scores on the EAT-26, we identified 20 participants who endorsed clinical levels of eating disorder pathology. However, this small sample size did not allow for meaningful analyses. Second, the present study did not include follow-up assessments, and long-term effects of the present strategies remain unclear. As noted elsewhere (Masuda, Feinstein, et al., 2010; Masuda, Twohig, et al., 2010), given the extremely brief nature of the intervention condition, their longer-term effects are not expected. From an RFT perspective, it is crucial to intervene on the historical context of the target body image thought in greater degree in order to achieve any meaningful longer-term effects (Hayes, Barnes-Holmes, et al., 2001).

Third, the present study exclusively relied on a single method (i.e., VAS) to assess each of the outcome variables. Although the VAS is a commonly used and widely accepted method in analogue investigations, additional methods, such as observation of overt behavioral change, could improve the assessment of defusion. Researchers have

begun to explore the validity of using behavioral outcomes for the assessment of cognitive defusion, such as relational responding latency (Kishita, Muto, Ohtsuki, & Barnes-Holmes, 2014) and mitigation of a learned helplessness preparation (Hooper & McHugh, 2013). While the self-report scales measure a reduction in proponent verbal functions associated with thoughts, the behavioral measures have the benefit of indicating the establishment of alternative behavioral functions, an aspect of great clinical significance in the psychological flexibility model (Hayes, Barnes-Holmes, et al., 2012). Beyond the aforementioned behavioral measures, behavioral outcomes utilizing RFT paradigms (Adcock et al., 2010; Dougher, Hamilton, Fink, & Harrington, 2007; Merwin & Wilson, 2005) have the additional benefit of isolating the mechanisms of the defusion process (i.e. changes in the transformation of function separate from changes in relational responding) and differentiating defusion from other cognitive constructs, such as cognitive restructuring (Blackledge, 2007; Luciano et al., 2014). Such "reverse-translational" experiments, which link the basic and applied research, could be key to empirically exploring the construct of defusion in an RFT-consistent fashion (Dougher, Twohig, & Madden, 2014).

Fourth, it is unclear whether the differential findings between the Full-Defusion condition and Partial Defusion condition are solely attributable to the addition of rapid vocal repetition of the target thought. For example, one could argue that the difference in believability might have been attributable to confounding factors, such as the different extent of exposure to the target thought or demand characteristics, not to the repetition of that thought.

Finally, in regards to methodological rigor, there is a concern regarding the use of a face-to-face format in delivering active interventions. Previous analogue studies employed a computerized program or audiotaped intervention (e.g., McMullen et al., 2008) in order to standardize the contents of intervention conditions across participants. The current investigation employed a contact-based face-to-face format in order to maintain an applied atmosphere in an analogue setting, and this might have led to the variability in intervention delivery to participants assigned to the same condition. Future studies should optimize the balance between methodological rigor and contextual nuance to maximize the internal and external validities of their findings.

5. Conclusions

In sum, the present preliminary investigation suggests the potential applicability of a rapid vocal repetition strategy with a self-referential negative body image thought, especially when administering it in combination with a clinical rationale, training with a neutral thought, and rapid vocal repetition of the target thought. This was also the first study demonstrating favorable effects of a cognitive defusion strategy for improving decentering from a negative body image thought. While these findings are encouraging, further studies should continue to investigate varying forms of rapid vocal repetition, including the additive effects of rapid vocal repetition of target thought. Additionally, future studies should investigate whether the effects of these rapid vocal repetition strategies vary across different functional aspect of the target thought, and whether pre-intervention levels of stimulus functions associated with that target thought moderate their effects.

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