

The impact of self-imagery on aspects of the self-concept in individuals with high levels of eating disorder cognitions

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Abstract

Background and objectives: Low self-esteem has been identified as a maintaining factor in Cognitive Behavioural models of eating disorders and links have been identified between early memories, negative core beliefs and mental imagery. This study explored the impact of positive and negative self-imagery on aspects of the working self (implicit and explicit self-esteem, self-concept clarity and self-discrepancy) and affect. Methods: Participants with high levels of eating disorder cognitions completed measures of explicit self-esteem, self-concept clarity, self-discrepancy and affect prior to completing a positive or negative self-imagery retrieval task. Baseline measures were then repeated and a measure of implicit self-esteem completed. Results: Positive self-imagery retrieval led to a significant increase in positive explicit self-esteem and a significant reduction in negative explicit self-esteem and actual-ideal self-discrepancies. Negative self-imagery retrieval led to a significant increase in negative explicit self-esteem and actual-ideal self-discrepancies and a significant reduction in positive explicit self-esteem. Levels of implicit self-esteem did not differ between the two groups post imagery manipulation. Retrieving a positive self-image also led to an improvement in state self-concept clarity; however, no effect was found for the negative self-imagery intervention. Holding a positive self-image in mind led to an increase in state positive affect and a reduction in state negative affect. The opposite was found for negative self-image retrieval. Limitations: The study did not measure implicit self-esteem at baseline. Conclusions: Imagery techniques that involve the retrieval of a positive self-image may help to improve aspects of the working-self and affect in those with eating difficulties.

1 Introduction

The transdiagnostic cognitive behavioural model of eating disorders highlights the over-evaluation of shape and weight and their control as central to the maintenance of all eating disorders ([Fairburn, Cooper, & Shafran, 2003](#)). This core psychopathology leads to a range of behaviours, including dietary restriction and extreme methods of weight control, as well as preoccupation with eating, weight and shape. For some, attempts to adhere to strict dietary rules will result in binge eating and factors such as hunger, mood changes and misperceptions regarding the effectiveness of compensatory behaviours (e.g., vomiting) as methods of weight control, all increase the risk of further binge eating. In patients who are underweight, the physiological and psychological consequences of starvation may also maintain the disorder, whilst social withdrawal and loss of previous interests serves to increase the importance placed on shape and weight. The model identifies four processes that may play a role in maintaining the eating disorder - clinical perfectionism, core low self-esteem, mood intolerance and marked interpersonal problems. In relation to core low self-esteem, it is proposed that negative processing biases and over-generalisations result in any perceived failures, no matter how minor, being interpreted as evidence that they are failures as people, reaffirming their overall negative sense of self and maintaining eating disorder psychopathology ([Fairburn et al., 2003](#)).

[Luke and Stopa \(2009\)](#) argue that although negative views of self are at the heart of many disorders, to date, our conceptualisations of the self have been too narrow, and this has limited the development of effective interventions. Therefore, the transdiagnostic model's inclusion of core low self-esteem as one of the maintaining factors in eating disorders is welcome; however, the model treats core low self-esteem as synonymous with explicit self-esteem (conscious and accessible beliefs about the self). In contrast, broader social psychology models of self-esteem define self-esteem as an active evaluative attitude towards the self ([Demo & Savin-Williams, 1992](#)) that includes both explicit and implicit (unconscious, automatic) attitudes towards the self (e.g., [Greenwald & Farnham, 2000](#)). Furthermore, self-esteem only represents one dimension of the self and following [Luke and Stopa's \(2009\)](#) argument, we

included two further dimensions that we hypothesised could be important contributory factors: self-concept clarity (i.e. the extent to which individuals hold a clear, internally consistent and stable view of the self, [Campbell, 1990](#); [Campbell et al., 1996](#)) and actual-ideal self-discrepancies ([Higgins, 1987](#); [Moretti & Higgins, 1990](#)). In general, stability of self-concept together with low actual-ideal self-discrepancies is associated with better psychological health. This is discussed in more detail below.

If negative views of self (incorporating low self-esteem, lack of clarity and large discrepancies between actual and ideal selves) are important then another potentially important target is the way that the 'self' can be represented by mental images. In eating disorders, these representations are heavily influenced by body, weight and shape and body dissatisfaction because of the way that physical representations of the self are linked to internal psychological evaluations of the self. There is already a body of evidence showing that mental imagery may contribute to the maintenance of eating disorders (e.g., [Cooper, 2009](#)). Imagery, early memories, and beliefs such as defectiveness and failure, have been linked in individuals with eating disorders (e.g., [Hinrichsen, Morrison, Waller, & Schmidt, 2007](#); [Somerville, Cooper, & Hackmann, 2007](#)). Specifically, individuals with bulimia nervosa (BN) described experiencing recurrent spontaneous negative self-images when thinking about their eating, shape and weight ([Hinrichsen et al., 2007](#)) and prior to vomiting ([Somerville et al., 2007](#)). Individuals with anorexia nervosa (AN) have also described recurrent and vivid negative self-images associated with 'feeling fat' ([Cooper, Deepak, Grocutt, & Bailey, 2007](#)). All of these images encompassed a negative perception of the individual's body shape and size, and were accompanied by feelings of shame, sadness and anxiety ([Cooper et al., 2007](#); [Hinrichsen et al., 2007](#); [Somerville et al., 2007](#)). These self-images were also associated with autobiographical childhood memories of negative comments about weight, shape and appearance ([Somerville et al., 2007](#)), early memories of rejection and worthlessness ([Cooper et al., 2007](#)), and with feelings of abandonment and humiliation ([Hinrichsen et al., 2007](#)). Collectively, these findings support a role for negative self-images in the maintenance of disordered self-views and they may trigger behavioural symptoms ([Hinrichsen et al., 2007](#)).

Given that the transdiagnostic model highlights the role of core low self-esteem in the maintenance of eating disorders, and research into imagery in eating disorders has demonstrated associations between imagery and beliefs about the self ([Cooper et al., 2007](#); [Hinrichsen et al., 2007](#); [Somerville et al., 2007](#)), the aim of this paper is to experimentally manipulate images of the self by activating positive and negative self-images and investigating the impact in a sample of non-clinical participants who reported high levels of eating disorder cognitions related to eating, weight and shape. The sample will be referred to as individuals with high levels of eating disorder cognitions throughout the remainder of the paper. We hope that better understanding the way in which self-images may represent the self and potentially influence different dimensions of self will allow us to generate hypotheses about the way that self-images may maintain eating disorders, which can then be tested directly on clinical populations.

We have argued above that there are links between imagery and the self. We propose that [Conway and Pleydell-Pearce's \(2000\)](#) Self Memory System (SMS) model and [Brewin's \(2006\)](#) retrieval competition hypothesis offer a sound theoretical framework for understanding the relationship between self and imagery. Both [Conway and Pleydell-Pearce \(2000\)](#) and [Brewin \(2006\)](#) propose that individuals have multiple self-representations; and [Conway and Pleydell-Pearce \(2000\)](#) stress the importance of autobiographical memory as a key feature both in self-representation and in imagery. They distinguish between the long-term self (which includes autobiographical knowledge and conceptual knowledge about the self), and the 'working self', which can be understood as the individual's current 'on-line' self that is activated in specific situations to achieve specific goals and comprises a subset of the information held by the long-term self. [Brewin \(2006\)](#) argues that positive and negative self-representations compete for retrieval, and repeated activation of a negative self-representation (or in Conway and Pleydell-Pearce's parlance a negative 'working self') increases its accessibility and inhibits the accessibility of more positive representations, thus serving to maintain negative self-views. We propose that in both cases, images can represent specific self-representations that can be linked to the past through autobiographical memory and/or to the future by representing goals that the self aspires to.

To our knowledge, there have been no studies to date that experimentally investigate the relationship between imagery and self-esteem in people with high levels of concern about eating, weight and shape, although, a small number of studies have investigated implicit and explicit self-esteem in eating disorders. [Cockerham, Stopa, Bell, and Gregg \(2009\)](#) reported that individuals with BN had a positive implicit self-esteem bias, compared to controls, even in the presence of low explicit self-esteem. [Cardi, Di Matteo, Gilbert, and Treasure \(2014\)](#) found that eating disordered individuals (with diagnoses of restricting and binge-purge subtypes of AN (RAN and BPAN respectively) and BN) had lower implicit positive self-evaluation than controls, whilst [Vanderlinden et al. \(2009\)](#) found that people with eating disorders (namely patients with RAN, BPAN and BN) had lower explicit self-esteem than healthy controls (although there was no significant difference in implicit self-esteem between patients and controls). The observed discrepancy across these studies between implicit and explicit self-esteem supports the argument that they measure two distinct, albeit related, constructs ([Hetts & Pelham, 2001](#)). [Greenwald and Banaji \(1995\)](#) proposed that implicit self-esteem is formed mainly through non-conscious automatic processing and is therefore unlikely to be affected by conscious information or manipulation, unlike explicit self-esteem ([Hetts & Pelham, 2001](#)). The discovery that individuals with BN experience negative self-images (e.g., [Hinrichsen et al., 2007](#)), but still report high levels of positive implicit self-esteem ([Cockerham et al., 2009](#)), suggests that consciously thinking about a negative image of oneself has more impact on explicit than implicit self-esteem. The studies discussed above have mixed findings. The variability of the patients within the samples may account for some of the variance between the studies, but it may also be related to some of the problems that have been found with implicit self-esteem measures like the Self-Esteem Implicit Association Test (SE-IAT; e.g., [Rothermund & Wentura, 2004](#); as discussed below).

Self-concept clarity is closely associated with self-esteem ([Campbell, 1990](#); [Campbell et al., 1996](#)) and a high degree of certainty over one's self-concept can contribute to self-confidence and to a positive self-view ([Baumgardner, 1990](#)). In comparison, uncertainty about the self has been linked with low self-esteem and less positive affect ([Baumgardner, 1990](#); [Campbell, 1990](#)). The first study in eating disorders that explored self-concept clarity

focused on a group of individuals with high levels of body dissatisfaction and found that accessing a negative self-image reduced self-concept clarity whilst accessing a positive self-image had no impact (author, year, described in more detail below). Despite self-concept clarity not being studied in patients with eating disorder diagnoses, discrepancies between implicit and explicit self-esteem in this population may create uncertainty and make it difficult to maintain a consistent and stable view of the self (Cockerham et al., 2009).

As well as discrepancies between implicit and explicit self-esteem, the gap between actual and ideal selves (Higgins, 1987) has not been extensively studied in eating disorders, despite its potential relevance. One of the core features of an eating disorder relates to the over-evaluation of weight and shape, and it is possible that this group are at particular risk of such self-discrepancies. Using an undergraduate sample, Higgins (1987) demonstrated that self-discrepancies between the actual and ideal self were associated with feelings of disappointment, dissatisfaction and dejection. More specifically, Bers and Quinlan (1992) found that individuals with AN had lower self-evaluation and more ideal-self-real-self disparity than non-clinical controls. Actual-ideal self-discrepancies have also been associated with low self-esteem (Moretti & Higgins, 1990) and predicted variance in self-esteem, depression and anxiety (McDaniel & Grice, 2008). Stopa (2009) suggested that high levels of discrepancies between different self-aspects may impact on the individual's clarity and stability of self-view, which could in turn affect self-esteem.

We recently completed a study that aimed to draw the areas of self-esteem and imagery together through exploring the impact of positive and negative imagery retrieval in women with high body dissatisfaction. We found that holding a positive body-related image in mind led to a significant increase in explicit self-esteem, body satisfaction and positive affect, and the opposite was true when a negative body related image was held in mind (author, year).

The current paper aims to build on the work of author (year) by investigating the impact of accessing positive and negative images of the self in a group of participants who had high levels of eating disorder cognitions. Similar to author (year) and drawing on parallel work in the field of social anxiety (see Hulme, Hirsch, & Stopa, 2012 for more details), we operationalised the working self in terms of self-esteem (implicit and explicit) and self-concept clarity. We also included a measure of actual-ideal self-discrepancies given the potential impact on self-worth in this population that was discussed above. We hypothesised that positive image retrieval would be associated with a positive working self, demonstrated by an increase in positive explicit state self-esteem and a reduction in negative explicit state self-esteem and actual-ideal self-discrepancies. In contrast, we hypothesised that negative imagery retrieval would be associated with a more negative working self, demonstrated by an increase in negative explicit state self-esteem and actual-ideal self-discrepancies and a reduction in positive explicit state self-esteem. Previous research has yielded inconsistent findings regarding the impact of self-imagery retrieval on implicit self-esteem and self-concept clarity (e.g., Hulme et al., 2012; Stopa, Brown, & Hirsch, 2011). Therefore, it was not possible to make a directional hypothesis in relation to these aspects of the self-concept. Given that the proxies for the working self employed in this study are related to affect (e.g., Baumgardner, 1990; Cockerham et al., 2009; Higgins, 1987; McDaniel & Grice, 2008), a secondary hypothesis predicted that retrieving a positive self-image would increase positive affect and decrease negative affect, and retrieving a negative self-image would have the opposite effect.

2 Material and methods

2.1 Participants

Three hundred and fifty-eight female university students were screened using the Eating Disorder Examination-Questionnaire 6.0 (Fairburn & Beglin, 1994). In order to recruit individuals who had high levels of eating disorder cognitions, we selected participants who obtained a global EDE-Q score above 2.7 (i.e. one standard deviation above the community sample mean; $M=1.55$, $SD=1.21$; Fairburn & Beglin, 1994). Of the 358 students screened, 121 obtained a global EDE-Q score above 2.7 and were invited to attend the experimental session. Seventy participants completed the experimental session but three were excluded and one withdrew as she found the imagery manipulation distressing. The final sample consisted of two groups, 33 participants in the positive imagery condition ($Mdn\ age=19.00$), and 33 participants in the negative imagery condition ($Mdn\ age=19.00$). There was no significant difference in age of participants between the two conditions, $U=521.50$, $z=-0.31$, $p=.75$.

2.2 Measures

2.2.1 Screening and descriptives

2.2.1.1 Eating Disorder Examination-Questionnaire 6.0 (EDE-Q; Fairburn & Beglin, 1994) The EDE-Q is a self-report questionnaire that assesses the key cognitive and behavioural aspects of eating disorders. The questionnaire generates the following four subscales: dietary restraint, weight concerns, shape concerns, and eating concerns, as well as frequency ratings for key eating disorder behaviours (e.g., objective binge-eating). The EDE-Q also provides a 'global score by summing the four subscale scores and dividing this number by four (the number of subscales completed). The EDE-Q has good psychometric properties (e.g., Berg, Peterson, Frazier, & Crow, 2011). There was no significant difference between the mean global EDE-Q scores of participants in the positive ($M=3.80$, $SD=0.60$) and negative ($M=3.61$, $SD=0.56$) imagery condition, $t(64)=1.33$, $p=.19$.

2.2.1.2 Rosenberg Self-Esteem Scale (RSE; Rosenberg, 1989) The RSE is a 10-item self-report questionnaire measuring explicit self-esteem. An example of an item on the RSE is "I feel that I have a number of good qualities". Items are scored on a 4-point likert scale ranging from *strongly agree* to *strongly disagree*. Total scores range from 10-40, with higher scores representing higher self-esteem. This measure has good internal reliability ($\alpha=0.92$; Corcoran & Fisher, 1987 (This should read Corcoran & Fischer)) and test-retest reliability over a six-month period (0.82; Murrell, Meeks, & Walker, 1991).

2.2.2 Dependent variables

2.2.2.1 State self-esteem scale (SSES; McFarland & Ross, 1982) The SSES is a 12-item reliable self-report questionnaire measuring explicit state self-esteem (McFarland & Ross, 1982). Participants rate how much each item represents their current feelings about themselves on a 1 (*not at all*) to 11 (*extremely*) scale. By summing the positively (e.g., confident, effective) and negatively (e.g., inadequate, ashamed) worded items separately two subscales can be calculated to identify positive and negative self-esteem (McFarland & Ross, 1982).

2.2.2.2 The Self-Esteem Implicit Association Test (SE-IAT; Greenwald & Farnham, 2000) The SE-IAT is a computerised reaction time task that tests the relative strength of association between two concept categories, and provides a measure of implicit self-esteem. In the current study, the SE-IAT comprised seven blocks of trials. In each block, participants classified words into categories by pressing one of two keys as quickly as possible without making errors. The category labels used were 'me' and 'not-me' for self-concept and 'positive' and 'negative' for self-attributes. The test words used in each category were taken from Cockerham et al.'s (2009) study; 'me' words included me, I, myself, my, mine and own; 'not-me' words included they, them, themselves, their, theirs and others; 'pleasant' words included valuable, worthy, acceptable, competent, reliable and confident; and 'unpleasant' words included defective, inadequate, inferior, weak, worthless and critical. If participants classified these words into a different category than those described above, the response was classified as an error.

The presentation of blocks three, four, six and seven were counterbalanced within the positive and negative imagery-manipulation groups to avoid order effects (Farnham, Greenwald, & Banaji, 1999). The SE-IAT was presented on the full screen of a laptop. The category labels were shown in the top left and right corners of the laptop screen in green capital letters. Test words were shown in the middle of the screen in white lower case letters. Participants pressed 'E' on the keyboard for test words associated with the left hand category and 'I' for test words associated with the right hand category. Category labels were shown on the screen throughout each block however the test words changed randomly on each trial (with an interval time of 100 ms). Errors were highlighted by a red cross appearing on the screen and a 200 ms pause, after which the next trial was presented without need for correction.

The underlying assumption of the SE-IAT is that when the associations presented are congruent with those stored in memory, participants will be quicker to respond compared to when the associations are incongruent (Greenwald, Nosek, & Banaji, 2003). Within the SE-IAT, a higher positive IAT-D effect score suggests stronger associations between self and positive words (compared to self and negative words), indicative of more positive implicit self-esteem (Greenwald et al., 2003). The SE-IAT has reasonable psychometric properties; it has a test-retest reliability coefficient of 0.52 (Greenwald & Farnham, 2000) and its internal validity ranges from 0.52 to 0.69 (Greenwald & Farnham, 2000; Bosson, Swann, & Pennebaker, 2000, respectively).

The SE-IAT was scored using Greenwald et al.'s (2003) improved scoring algorithm and data from blocks three, four, six and seven were used in the scoring. Error trials were identified and replaced with the block mean latency and an additional 600 ms penalty. The means for each block were then calculated and a difference score between the two mean scores on the practice and test blocks were calculated. These scores were then divided by the pooled standard deviations. The mean of the resulting scores were averaged to obtain the final score, the IAT-D effect. As no trials had either response latencies greater than 10,000 ms or over 10% of trials in less than 300 ms, all data were used in the analyses.

2.2.2.3 State Self-Concept Clarity Scale (SSCCS; Nezlek & Plesko, 2001) The SSCCS is a four item reliable self-report questionnaire measuring state self-concept clarity (Nezlek & Plesko, 2001). It contains items 1, 4, 8 and 9 of the Self-Concept Clarity Scale (Campbell et al., 1996). Participants rate how much they currently agree with each statement on a 1 (*strongly disagree*) to 5 (*strongly agree*) scale. Lower scores indicate more clearly and confidently defined self-beliefs.

2.2.2.4 Self-discrepancy index (SDI; Dittmar, Beattie, & Friese, 1996) The SDI measures actual-ideal self-discrepancies and the state measure of self-discrepancy was used in the current study (Dittmar, Halliwell, & Stirling, 2009). The state SDI requires participants to think about the personal ideals they hold about themselves right now. Participants are asked to write down something they would like to change about themselves and how they would ideally like to be instead. Using a 6-point likert scale (1 *hardly*, 6 *extremely*) participants are then asked to rate each self-discrepancy they generate in terms of how different they currently are from their ideal (magnitude of self-discrepancy) and how concerned they currently are about this difference (importance of self-discrepancy). To score the SDI, the magnitude and importance ratings for each self-discrepancy are multiplied; these products are then summed, and then divided by the number of self-discrepancy statements that the participant supplied. Higher scores indicate greater self-discrepancy between actual and ideal self. In this study, prior to carrying out the imagery manipulation participants were asked to write down up to five self-discrepancies on the SDI and rate the magnitude and importance of each one. Participants were asked to repeat the SDI magnitude and importance ratings following the imagery intervention.

2.2.2.5 Positive and negative affect scales (PANAS; Watson, Clark, & Tellegen, 1988) The PANAS is a 20-item reliable and valid self-report questionnaire measuring state positive and negative affect (Watson et al., 1988). Participants rate how much each item reflects their current mood on a 1 (*very slightly or not at all*) to 5 (*extremely*) scale. Two subscale scores can then be calculated by summing the positively and negatively worded items separately to obtain a score for positive and negative mood.

2.3 Experimental task: imagery manipulation

The imagery scripts used by author (year) were adapted by the authors to create two scripts to help participants retrieve a positive or negative image of the self. In author (year) study participants were asked to think of a self-image based on their body, whereas in the current study participants were instructed to focus on a self-image overall (i.e. a general sense of themselves when they are feeling good (positive condition) or negative (negative condition) about themselves). To provide context, the beginning of the imagery scripts were as follows: "I would like you to think of a time when you have felt positive/negative about yourself. You may have felt happy, confident, relaxed or similar (positive script)/sad, upset, lacked confidence, stressed out or similar (negative script). Often when people feel happy, confident or relaxed they feel good about themselves and may have a positive image of themselves in their mind. I'm

going to try to help you get hold of the image and the general sense of yourself you have when you are feeling good about yourself (positive script)/Often when people feel sad, upset or stressed out they feel negative about themselves and may have a negative image of themselves in their mind. I'm going to try to help you get hold of the image and the general sense of yourself you have when you are feeling negative about yourself (negative script).” Once the image was identified, participants were asked to recreate the image they had of themselves in their mind as vividly as possible, noticing any emotions towards the self that the image induced. Participants were then instructed to hold the self-image in mind whilst they completed the measures immediately after the imagery manipulation.

2.4 Manipulation checks

During the imagery interview participants rated how positive/negative the image was on a scale of 0 (*not at all positive/negative*) to 100 (*extremely positive/negative*). If participants responded with a number lower than 60 they were asked to think of another situation and the interview was started again. Participants also rated the vividness of the self-image they retrieved on a scale of 0 (*not at all vivid*) to 100 (*extremely vivid*). If participants rated the vividness of the image as lower than 60 they were asked for further details about the image to increase its vividness. After completing the post-imagery manipulation measures participants were asked to rate the percentage of time they were able to hold the self-image in mind whilst they completed the questionnaires and the SE-IAT on a scale of 0% (*not at all*) to 100% (*all the time*).

2.5 Procedure

In the experimental session, participants read the information sheet and completed the consent form. Participants then completed the RSE, SSES, SSCCS, SDI and PANAS, which were counterbalanced. Participants were randomly assigned to the positive or negative imagery condition. Following the imagery interview participants completed the SSES, SSCCS, SDI and PANAS in the counterbalanced order, the SE-IAT and the final manipulation check questions. The study received ethical approval from the local university.

2.6 Data analysis

An a priori power calculation indicated that a sample size of 60 was required to achieve a power (1 - β) of 0.85. Data were screened for parametric assumptions. Where assumptions were violated, data were transformed (Field, 2013). If transformations did not improve the distribution, non-parametric tests were used in simple comparisons. A series of 2 (Imagery condition [positive and negative]) x 2 (Time [pre and post imagery manipulation]) mixed ANOVAs were used to analyse all variables apart from the SE-IAT. Post hoc independent and repeated measures t-tests applying the Bonferroni correction were employed to interpret the reported interactions (Field, 2013). An independent t-test was used to analyse the data from the SE-IAT.

3 Results

3.1 Descriptive statistics

Table 1 shows the mean scores and standard deviations for all the descriptive measures administered at baseline and post manipulation for the two imagery conditions. There were no significant differences between the positive and negative imagery condition on any of the baseline measures (*p* values ranged from 0.20 to 0.89).

Table 1 Mean Scores and Standard Deviations (in parenthesis) for all of the Measures administered at Baseline and Post Manipulation for each Self-Imagery Condition.

Measure	Positive Self-Imagery Condition		Negative Self-Imagery Condition	
	(n = 33)		(n = 33)	
	Baseline	Post	Baseline	Post
RSE	17.27 (4.18)		16.09 (4.13)	
State Positive Self-Esteem	44.55 (8.78)	51.00 (13.42)	41.61 (9.71)	31.39 (12.68)
State Negative Self-Esteem	22.33 (8.47)	15.06 (9.10)	21.70 (8.29)	33.09 (8.58)
State Self-Concept Clarity	13.79 (3.83)	12.27 (4.75)	14.21 (3.14)	14.48 (3.06)
State Self-Discrepancy	18.78 (5.24)	14.81 (7.56)	19.68 (3.38)	26.73 (5.27)
State Positive Affect	27.64 (8.20)	32.85 (10.16)	27.91 (7.64)	22.18 (8.49)

State Negative Affect	17.42 (6.26)	15.58 (7.20)	17.06 (5.82)	24.55 (7.86)
IAT D Effect Score		0.08 (0.73)		-0.03 (0.60)

Notes. Rosenberg Self-Esteem Scale (RSE; [Rosenberg, 1989](#)), Implicit Association Test (IAT; [Greenwald & Farnham, 2000](#)).

3.2 Imagery manipulation checks

There was no significant difference between the two imagery conditions on valence, $t(59.36) = 0.56$, $p = .58$ or vividness, $U = 520.20$, $z = -0.31$, $p = .76$. of the retrieved image. There was also no significant difference between the imagery conditions on the percentage of time participants were able to hold the self-image in mind whilst completing the post-imagery manipulation questionnaires, $U = 455.50$, $z = -1.16$, $p = .25$ or the post-imagery manipulation SE-IAT, $t(64) = -1.31$, $p = .19$. This indicates that participants were equally able to hold positive and negative images in mind and that the subsequent results were not influenced by one type of image (e.g., negative) being more accessible than the other.

3.3 Self-concept measures

3.3.1 Explicit state positive self-esteem

There was a main effect of condition, $F(1,64) = 19.63$, $p < .001$, partial $\eta^2 = 0.24$, no main effect of time, $F(1,64) = 2.74$, $p = .10$, partial $\eta^2 = 0.04$, but there was a significant time \times condition interaction, $F(1,64) = 53.96$, $p < .001$, partial $\eta^2 = 0.46$. Positive self-esteem significantly increased after positive imagery retrieval, $t(32) = -3.59$, $p < .001$, $r = 0.54$, and significantly decreased after negative imagery retrieval, $t(32) = 7.40$, $p < .001$, $r = 0.80$.

3.3.2 Explicit state negative self-esteem

There were main effects of condition, $F(1,64) = 21.04$, $p < .001$, partial $\eta^2 = 0.25$ and time, $F(1,64) = 4.70$, $p = .034$, partial $\eta^2 = 0.07$, and a significant time \times condition interaction, $F(1,64) = 96.47$, $p < .001$, partial $\eta^2 = 0.60$. Negative self-esteem significantly increased after negative imagery retrieval, $t(32) = -8.86$, $p < .001$, $r = 0.84$, and significantly decreased after positive imagery retrieval, $t(32) = 5.20$, $p < .001$, $r = 0.68$.

3.3.3 Implicit self-esteem

There was no significant difference between the positive ($M = 0.08$, $SD = 0.13$) and negative ($M = -0.03$, $SD = 0.10$) imagery condition on levels of implicit self-esteem after the imagery manipulation, $t(64) = 0.55$, $p = .58$, $r = 0.07$.

3.3.4 State self-concept clarity

There was no main effect of condition, $F(1,64) = 2.25$, $p = .14$, partial $\eta^2 = 0.03$, but there was a main effect of time, $F(1,64) = 4.70$, $p = .031$, partial $\eta^2 = 0.07$, and a significant time \times condition interaction, $F(1,64) = 9.73$, $p = .003$, partial $\eta^2 = 0.13$. State self-concept clarity significantly improved following positive imagery retrieval, $t(32) = 3.27$, $p = .003$, $r = 0.50$. However, there was no difference between pre and post state self-concept clarity scores in the negative condition, $t(32) = -0.81$, $p = .43$, $r = 0.14$.

3.3.5 State self-discrepancies

There were main effects of condition, $F(1,64) = 27.94$, $p < .001$, partial $\eta^2 = 0.30$ and time, $F(1,64) = 5.86$, $p = .018$, partial $\eta^2 = 0.08$, and a significant time \times condition interaction, $F(1,64) = 75.14$, $p < .001$, partial $\eta^2 = 0.54$. Self-discrepancies significantly decreased following positive imagery retrieval, $t(32) = 3.47$, $p < .001$, $r = 0.51$ and significantly increased following negative imagery retrieval, $t(32) = -12.82$, $p < .001$, $r = 0.91$.

3.3.6 Summary of the impact of positive and negative imagery on self-variables

Overall, these results indicate that positive self-images increased positive explicit self-esteem, improved state self-concept clarity and reduced negative explicit self-esteem and actual-ideal self-discrepancies. In comparison, negative self-images increased negative self-esteem and actual-ideal self-discrepancies and reduced positive explicit self-esteem. Negative self-images had no impact on self-concept clarity.

3.4 Affect measures

3.4.1 State positive affect

There was a main effect of condition, $F(1,64) = 6.63$, $p = .012$, partial $\eta^2 = 0.09$, no effect of time, $F(1,64) = 0.14$, $p = .71$, partial $\eta^2 = 0.002$, but a significant time \times condition interaction, $F(1,64) = 61.17$, $p < .001$, partial $\eta^2 = 0.49$. Positive affect

significantly increased after positive imagery retrieval, $t(32) = -4.97, p < .001, r = 0.67$, and decreased after negative imagery retrieval, $t(32) = 6.19, p < .001, r = 0.74$.

3.4.2 State negative affect

There were main effects of condition, $F(1,64) = 8.46, p = .005$, partial $\eta^2 = 0.12$ and time, $F(1,64) = 12.49, p < .001$, partial $\eta^2 = 0.16$, and a significant time \times condition interaction, $F(1,64) = 34.24, p < .001$, partial $\eta^2 = 0.35$. Levels of negative affect significantly increased following negative imagery retrieval, $t(32) = 7.51, p < .001, r = 0.80$, and decreased following positive imagery retrieval, $t(32) = -2.68, p = .011, r = 0.43$.

3.4.3 Summary of the impact of positive and negative images on affect

Overall, the results of the state affect measures demonstrate that positive images increase positive and decrease negative affect, whereas negative images do the opposite (increase negative and decrease positive affect).

4 Discussion

This study had two aims. The first was to investigate the impact of manipulating positive and negative self-images on three aspects of the self-concept in a sample of individuals with high levels of eating disorder cognitions and the second was to investigate the impact of these images on state affect. In accordance with our hypotheses, holding a positive self-image in mind resulted in a significant increase in positive explicit self-esteem and a significant reduction in negative explicit self-esteem and actual-ideal self-discrepancies. In comparison, holding a negative self-image in mind resulted in a significant increase in negative explicit self-esteem and actual-ideal self-discrepancies and a significant reduction in positive explicit self-esteem. Levels of implicit self-esteem did not differ between the two groups after the imagery manipulation. Whereas retrieving a positive self-image also led to an improvement in state self-concept clarity, holding a negative self-image in mind had no impact. In accordance with the secondary hypothesis, retrieving a positive self-image resulted in an increase in state positive affect and a reduction in state negative affect. The opposite was found when a negative self-image was retrieved.

The findings of this study are consistent with the proposal that self-images may reflect the current working self in [Conway and Pleydell-Pearce's \(2000\)](#) SMS model. In this study, the working self-concept was operationalised in terms of self-esteem, self-concept clarity and actual-ideal self-discrepancies and we hypothesised that asking individuals to retrieve positive or negative self-images would facilitate the retrieval of different working self-concepts. The results of the current study, together with previous research on other participant groups, are consistent with this hypothesis ([Hulme et al., 2012](#)).

There are several routes through which recurrent negative self-images may maintain the negative self-view characteristic of individuals with high levels of eating disorder cognitions. Firstly, individuals may become trapped in a cycle whereby negative self-images and the negative working self mutually reinforce each other ([Hulme et al., 2012](#)). Secondly, in line with Brewin's retrieval competition hypothesis (2006), the repeated activation of negative self-images may increase the accessibility of these self-representations. This preferential activation may in turn inhibit the availability of positive self-representations that have the potential to challenge negative self-views, and in so doing, improve a person's sense of self-worth ([author, year](#)).

The results of this study suggest that self-imagery has a greater impact on explicit self-esteem than on implicit self-esteem. Given that this study involved conscious self-image manipulation it is perhaps not surprising that the self-imagery retrieval did not affect the automatic, unconscious self-evaluations referred to as implicit self-esteem. This finding supports the assertion that implicit self-esteem is relatively stable across time and situations ([Greenwald & Banaji, 1995](#)) and is consistent with previous research in this field (e.g., [Author, Year](#)). However, it is possible that demand characteristics within the study may also explain the discrepancy between implicit and explicit self-esteem measures. Furthermore, as implicit self-esteem was only measured at one time point we cannot conclude that there were no changes across time, only that there were no differences between positive and negative self-imagery retrieval. Future research could investigate whether repeatedly accessing self-images over a longer period of time has an impact on levels of implicit self-esteem. [Stopa \(2009\)](#) asserts that the self is a result of multiple processes which are available through conscious and unconscious awareness. Therefore, if self-images do function within the SMS and are directly able to influence the construction of the self, it is possible that repeatedly accessing self-images may influence implicit as well as explicit self-esteem.

Still, the results are not all symmetrical. This study found that positive self-imagery improved self-concept clarity, whereas negative self-imagery had no impact on this aspect of the self-concept. This result is in contrast to [author \(year\)](#) who found that negative self-imagery reduced self-concept clarity whereas positive self-imagery had no impact on this construct. The chronicity of negative self-views in at least some people with eating disorders ([Fairburn et al., 2003](#)) may help to explain part of this result. Accessing a negative self-image may simply confirm the individual's prevailing view of self and therefore leave self-concept clarity unaffected. However, if this is the case then positive self-images that conflict with the predominant negative view of self should lead to a reduction in clarity because the positive image is likely to be in conflict. We found the opposite. Self-enhancement has been identified as the most important of the four self-evaluation motives identified in social psychology (e.g., [Sedikides & Strube, 1997](#)) and it is possible that activation of a positive working self through the positive imagery manipulation makes this form of self-enhancement more salient, and thus improves clarity about the self.

Individuals with eating disorders have previously been found to have more ideal-self-real-self disparity than non-clinical controls ([Bers & Quinlan, 1992](#)). Given that low self-esteem has been associated with more actual-ideal

self-discrepancies in other groups (Moretti & Higgins, 1990), it makes theoretical sense that retrieving a negative self-image was associated with both reduced explicit positive self-esteem and increased actual-ideal self-discrepancies for individuals with high levels of eating disorder cognitions. By comparison, positive self-imagery retrieval was associated with increased explicit positive self-esteem and decreased actual-ideal self-discrepancies. Similar to the argument outlined above about how self-imagery may affect explicit self-esteem, repeated activation of negative self-images is likely to continuously reinforce a negative self-view and subsequently increase, or at least maintain, the discrepancy between the actual and ideal self. This discrepancy may play a role in maintaining high levels of eating disorder cognitions as individuals will continue to strive to reduce their self-discrepancies through controlling their eating, weight and shape.

This study has a number of limitations. The use of a simple pre-post design may have increased the likelihood of the results being affected by demand characteristics. Secondly, as noted above, this study did not include a baseline measure of implicit self-esteem as the SE-IAT only has modest test-retest reliability (Bosson et al., 2000). Consequently, it is unclear whether participants in the two self-imagery conditions had comparable levels of implicit self-esteem at the start of the study and therefore we do not know if the imagery manipulation affected implicit self-esteem or not. We also acknowledge that despite the SE-IAT being a popular tool, its validity in measuring automatic evaluations and implicit self-esteem has been criticised (e.g., Rothermund & Wentura, 2004). Another limitation of this study is that we only collected data at two time points and therefore we do not know if the beneficial effects of accessing a positive self-image were maintained. Future research would therefore benefit from collecting follow-up data at multiple time points. A further limitation is that the sample in this study consisted of participants with high levels of eating disorder cognitions. Although this group offers a viable analogue for individuals with eating disorders, it is not a clinical sample and future research would benefit from repeating the study with a comparison group (e.g., individuals with low levels of eating disorder cognitions) and replicating the study in a clinical sample. Further research could also include a control condition whereby participants hold a neutral image in mind, in addition to the positive and negative conditions, in order to investigate the effect of holding any type of self-image in mind. Future research using a similar design to the current study may also benefit from including a measure of visual imagery vividness, such as the Vividness of Visual Imagery Questionnaire (VVIQ; Marks, 1973), to assess whether the vividness of participants' visual imagery affects the impact of the imagery manipulation.

5 Conclusions

Whilst recent advances in eating disorder theory highlight the role of core low self-esteem in the maintenance of eating disorders, models such as the SMS (Conway & Pleydell-Pearce, 2000) offer a more detailed framework within which to understand the concept of the self and the role of self-imagery in this population. The findings of the present study build on previous work and offer further evidence of the potential clinical benefits of using imagery related techniques, such as positive imagery retrieval, when working with individuals with high levels of eating disorder cognitions.

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None to declare.

Appendix A. Supplementary data

Supplementary data related to this article can be found at <https://doi.org/10.1016/j.jbtep.2018.05.002>.

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Appendix A. Supplementary data

The following is the supplementary data related to this article ([The Multimedia component 1 link shows the email address jodieharlowe@yahoo.co.uk. Please can the email address be changed to jodie.harlowe@nhs.net](#)):

[Multimedia Component 1](#)

Data profile

alt-text: Data profile

Highlights

- Impact of positive and negative self-imagery on the working-self and mood.
 - Positive self-imagery improved positive self-esteem and self-concept clarity.
 - Positive self-imagery reduced actual-ideal self-discrepancies and improved mood.
 - Negative self-imagery had a negative impact on the self-concept and affect.
 - Positive imagery retrieval may help to improve self-concept in this group.
-

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