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Jong, M. de

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Chapter 2

Explicit, implicit and discrepant self-esteem in eating disorders

Martie de Jong^{1,2}, Sjoukje E. Sinke¹, Peter J. de Jong³,
Kees Korrelboom^{2,4}, Mathijs L. Deen^{2,5}, Philip Spinhoven^{6,7}

1. Center for Eating Disorders – PsyQ, Parnassia Psychiatric Institute, The Hague, The Netherlands
2. Parnassia Psychiatric Institute, The Hague, The Netherlands
3. Department of Clinical Psychology, University of Groningen, Groningen, The Netherlands
4. Department of Medical and Clinical Psychology, Tilburg University, Tilburg, The Netherlands
5. Methodology and Statistics Unit, Institute of Psychology, Leiden University, Leiden, The Netherlands
6. Institute of Psychology, Leiden University, Leiden, The Netherlands
7. Department of Psychiatry, Leiden University Medical Center, Leiden, The Netherlands

Abstract

This study examined whether explicit self-esteem (ESE), implicit self-esteem (ISE) and the discrepancy between these two constructs – discrepant self-esteem (DSE) – are associated with (severity of) eating disorders (ED).

A between-group cross-sectional design with 36 patients with an ED and 37 participants without ED pathology was conducted. The Rosenberg Self-Esteem Scale, the self-esteem Implicit Association Test, the Eating Disorder Examination Questionnaire and the Mini International Neuropsychiatric Interview were administered to measure respectively ESE, ISE, ED psychopathology and ED diagnosis. Furthermore, five different operationalizations of DSE were examined.

Although both ESE and ISE were lower in patients with ED's than in the comparison group, there was no unique contribution of ISE in predicting ED status. Moreover, only ESE was a significant predictor for the severity of ED psychopathology. Outcomes for the role of DSE in ED were mixed. In conclusion, especially low ESE seems to be associated with (severity of) ED psychopathology.

Keywords

implicit self-esteem, explicit self-esteem, discrepant self-esteem, eating disorders, Implicit Association Test

Introduction

Low self-esteem is frequently reported to be a transdiagnostic factor associated with the etiology and persistence of psychopathology in general (Zeigler-Hill, 2011) including eating disorders (ED) (Cervera et al., 2003; Fairburn, Cooper & Shafran, 2003; Jacobi et al., 2004; Lo Coco et al., 2011; Sassaroli, Gallucci & Ruggiero, 2008). It is often referred to as one of the factors that can lead to strive to control eating, shape and weight in a way to gain some sense of self-worth resulting in a dysfunctional scheme of self-evaluation. As a result, the judging of self-worth becomes largely dependent of shape and weight and the ability to control them. This “overevaluation of shape and weight” is seen as the core psychopathology of most ED (Fairburn, 2008). Although, unlike anorexia nervosa (AN) and bulimia nervosa (BN), the overevaluation of shape and weight (and body dissatisfaction) is not a diagnostic criterion for BED, empirical evidence demonstrates that this is also markedly increased in individuals with BED (Ahrberg et al., 2011).

Most studies of self-esteem in relation to psychopathology used a self-report measure of self-esteem (Rosenberg, 1965) which taps participants' explicit personal reflection and evaluation of their positive and negative characteristics as a person, so-called explicit self-esteem (ESE). The last two decades, studies have started to differentiate ESE from implicit self-esteem (ISE). Research suggests that ESE and ISE stem from different sources and should be seen as different constructs (Rudman, 2004; Rudman, Phelan & Heppen, 2007). The differentiation between ESE and ISE stems from dual-process models (Gawronski & Bodenhausen, 2006; Zeigler-Hill, 2011) and is based on the assumption that there are two distinct processing modes: a rule-based, propositional processing mode and a relatively automatic, associative processing mode. Explicit attitudes reflect the outcome of the weighing of propositions and are based on knowledge about facts and values (Strack & Deutsch, 2004), whereas implicit attitudes are assumed to rely on associative, direct activation processes. The relevance of differentiating between ESE and ISE is further emphasized by the view that both facets of self-esteem are differentially involved in more controlled/strategic versus more automatic/spontaneous behaviors (Rudolph et al., 2010). ESE is considered to be relevant in the context of more deliberative behavior (in the context of eating disorders for example weighing oneself or dieting), while ISE is argued to be critically involved in more spontaneous behaviors (in the context of eating disorders for example checking or attentional avoidance of “ugly” body parts).

Cross-sectional studies investigating the relationship between ISE and symptoms in clinical disorders show mixed results. Most of these studies target depression (Franck, De Raedt & De Houwer, 2007; Franck, De Raedt, Dereu & Van den Abbeele, 2007; Lemmens et al., 2014; Risch et al., 2010; Rudolph et al., 2010) and/or (social) anxiety (Glashouwer, Vroling et al., 2013; Ritter et al., 2013; van Tuijl et al., 2016).

Research on ISE in individuals with ED is limited. VanderLinden et al. (2009) found a lower ISE in a group of patients with an ED (anorexia nervosa or bulimia nervosa) compared to a non-eating disorder control group. In this study no correlation was found between ESE and ISE, indicating that ESE and ISE could be different constructs of the self. Cockerham et al. (2009) compared patients with bulimia nervosa or binge eating disorder with a comparison group without an eating disorder. The ED group had lower ESE, but against the expectation, a more positive ISE than the comparison group. Hoffmeister et al. (2010) examined ISE and its link to body shape and weight concerns among restrained and unrestrained eaters, after increasing the participants' awareness of their body shape and weight. Whereas ISE increased for unrestrained eaters, it decreased for restrained eaters. They suggest that restrained eating status and/or initial level of body dissatisfaction might determine whether ISE decreases or increases as a result of an activation of the body schema. In a study including a BED sample, participants with BED were found to have lower ISE when compared to the comparison group (Brauhardt, Rudolph & Hilbert, 2014).

According to Zeigler-Hill (2011) a combination of high ESE and low ISE, or vice versa, points to discrepant self-esteem (DSE). Results from studies investigating the relationship between DSE and symptoms in clinical disorders among which depressive disorder (Creemers et al., 2012; Franck, De Raedt, Dereu & Van den Abbeele, 2007), social anxiety disorder (Schreiber et al., 2012; van Tuijl et al., 2014; van Tuijl et al., 2016) and narcissistic behavior (Jordan et al., 2003), are also mixed. Something to note is that in most of these studies different kinds of operationalizations of DSE were used (van Tuijl et al., 2016), complicating direct comparisons between studies and possibly explaining differences in outcome.

We only found two studies within the field of ED and DSE. Bos et al. (2010) found that DSE was not associated with eating problems in non-clinical adolescents. As mentioned before, in the study of Cockerham et al. (2009), participants with ED demonstrated a higher ISE than the healthy controls in combination with a lower ESE. The combination of a higher ISE and lower ESE in the ED group was interpreted as DSE.

In conclusion, although there is robust evidence for a relationship between low ESE and ED, research in the field of ED on ISE and DSE is still scarce. The purpose of this study was to gain more insight into the relationship of ESE, ISE and DSE in a transdiagnostic ED sample. More specifically, the purpose of the study was threefold: (a) to assess possible differences in ESE and ISE between ED patients as compared to a comparison group; (b) to assess the relation of ESE and ISE with the severity of ED; and (c) to assess possible differences in DSE between ED patients as compared to controls using different ways of operationalizing DSE.

Method

Participants

The clinical sample was recruited from a mental health center specialized in ED: PsyQ/ Parnassia Psychiatric Institute in the Netherlands. By spreading invitations via clinicians, patients were asked to participate after they had been diagnosed with an ED by certified clinicians. When clinicians thought participants had suicidal or psychotic symptoms, if there was intellectual disability or when the understanding of the Dutch language in reading and understanding was insufficient, patients were not approached. After signing informed consent, the Mini-International Neuropsychiatric Interview (Sheehan et al., 1998) was administered by three certified and trained psychologists to check whether participants still met diagnostic criteria at the time of testing. The MINI only classifies anorexia nervosa (AN) and bulimia nervosa (BN). A binge eating disorder (BED; which is not an official DSM-IV diagnosis) was classified when there were recurrent episodes (at least 2 days a week for 6 months) of binge eating in the absence of regular use of inappropriate compensatory behavior (e.g., purging, fasting, excessive exercise) typically seen in patients with BN. The total clinical sample comprised 36 participants with either AN ($n=11$), BN ($n=7$) or EDNOS ($n=18$ of which BED=15).

The comparison group of 37 participants was a convenience sample, personally recruited from an athletics club and via the social network of the researchers by an information letter. They were excluded when their knowledge of the Dutch language was insufficient to complete the questionnaires, had elevated levels of eating pathology on the SCOFF (Morgan, Reid & Lacey, 1999) or had received pharmacological or psychotherapeutic interventions for emotional problems in the past two years. Demographic and diagnostic characteristics of both groups are shown in Table 2.1.

The study protocol was approved by the Internal Review Board of Parnassia Psychiatric institute and written informed consent was obtained from all respondents.

Measures

Mini-International Neuropsychiatric Interview (MINI): ED and comorbid Axis I DSM-IV diagnosis were determined in the ED group using the MINI International Neuropsychiatric Interview 5.0.0 (Overbeek, Schruers & Griez, 1999; Sheehan et al., 1998). The MINI is a short, structured, diagnostic interview designed to verify the diagnostic criteria according to the DSM-IV. The MINI has a good correlation with the Structured Clinical Interview for DSM-IV-TR Axis I (SCID-I) (Pinninti et al., 2003).

Eating Disorder Examination Questionnaire (EDE-Q): The EDE-Q (Fairburn & Beglin, 1994; van Furth, 2000), is a 36-item self-report questionnaire providing an assessment of the specific psychopathology of ED behavior. This questionnaire was administered in both groups. Respondents rate the items on a 7-point scale, ranging between 0 (no days) and 6 (everyday) over the previous 28 days in which specific behaviors and attitudes occurred. It includes 22 items assessing the core attitudinal features of ED psychopathology. The 22 items together comprise four subscales, assessing restraint, shape concerns, weight concerns and eating concerns over the previous 28 days. The EDE-Q has good psychometric properties (Luce & Crowther, 1999; Mond et al., 2004). A validation study concerning the Dutch translation of the EDE-Q (Aardoom et al., 2012) did not support the theorized four subscales of the EDE-Q. In the current study the global EDE-Q score will be calculated by summing and averaging all individual items, so that all items possess equal weight. Higher scores are indicative of higher ED psychopathology.

SCOFF: The SCOFF (abbreviation is an acronym from the questions) (Morgan et al., 1999) is a widely used self-administered five question test to assess the possible presence of an ED. One point is assigned for every "yes"; a score ≥ 2 indicates a possible ED. The SCOFF is found to be capable to exclude ED (Morgan et al., 1999). The SCOFF was completed by the comparison group to exclude participants with a possible presence of an ED.

Self-report Symptom Checklist-90 (SCL-90): The SCL-90 (Arrindell & Ettema, 1986; Derogatis & Cleary, 1977) is a 90-item self-report checklist oriented to screen for a broad range of psychological problems and psychopathology

in the past seven days. It contains 90 items, scored on a 5-point severity scale, measuring eight primary symptom dimensions named 'anxiety', 'agoraphobia', 'depression', 'somatization', 'interpersonal sensitivity', 'cognitive-performance difficulty', 'hostility', and 'sleep disturbance'. Higher scores are indicative for more psychopathology. The Dutch version of the SCL-90 has been shown to have good psychometric properties (Arrindell & Ettema, 1986). The SCL-90 depression dimension was completed by both groups to describe their severity level of depressive symptoms.

Table 2.1. Gender and education level for the clinical (n=36) and the comparison group (N=37)

	ED	Percentage	CG	Percentage
Age (Mdn)	26		40	
Gender				
Male	2	5.4	1	2.7
Female	34	94.6	36	97.3
Education Level				
LO/LVO	2	5.6	0	0.0
LBO	1	2.8	1	2.7
MAVO	4	11.1	4	10.8
MBO	13	36.1	4	10.8
HAVO	5	13.9	2	5.4
HBO	8	22.0	10	27.0
VWO	0	0.0	6	16.2
WO	3	8.3	10	27.0
Diagnosis				
AN	11	30.6		
BN	7	19.4		
BED	15	41.7		
EDNOS	3	8.3		
Mean BMI (SD)	27.8 (10.2)			
MINI (SD) ^a	1.7 (1.4)			

ED = clinical group with an eating disorder, CG = comparison group;

LO/LVO = lower education, LBO = community college, MAVO = lower general secondary education,

MBO = intermediate vocational education, HAVO = higher general secondary education,

HBO = higher professional education, VWO = pre-university education, WO = university;

AN = Anorexia Nervosa, BN = Bulimia Nervosa, BED = Binge Eating Disorder, EDNOS = Eating Disorder Not Otherwise Specified, BMI = Body Mass Index, MINI = Mini-International Neuropsychiatric Interview

^a Mean amount of diagnosis on the MINI

Implicit Association Test (IAT): A self-esteem version of the IAT (Greenwald, McGhee & Schwartz, 1998) was used as a measure of ISE in both groups. The IAT is a computerized reaction time task originally designed to measure the relative strengths of automatic associations between two contrasted target concepts and two attribute concepts. Words from the two target concepts and the two attribute concepts appear in mixed order in the middle of a computer screen and participants are instructed to sort them with a left (Q) or right (P) response key. The assumption is that the categorization becomes easier when a target and attribute that share the same response key are strongly associated than when they are dimly associated. The target concept pair used in the self-esteem IAT was self-others (Dutch words for I, self, my, own and they, their, you, other, themselves). The attribute concept pair was positive - negative (Dutch words for successful, important, valuable, secure, meaningful, and unimportant, worthless, failure, useless, weak) (see Table 2.2 for an overview). When someone finds it easier (i.e. reaction time is faster) to sort words for the concept of self and positive with the same response key than of self and negative, it indicates a higher positive self-esteem. Higher IAT scores indicate higher implicit self-esteem. The IAT has been shown to have good psychometric properties (Bosson, Swann & Pennebaker, 2000). To calculate the IAT-effect we used the algorithm as proposed by Greenwald, Nosek & Banaji (2003) which has shown to perform best in the current measurement setting (Glashouwer, Smulders et al., 2013). Reaction times above 10,000 ms were excluded and error trials were replaced with the block mean plus an added penalty of 600 ms (Greenwald et al., 2003). Mean reaction times (RTs) of block 3 were subtracted from those of block 5 RTs, and RTs of block 7 were subtracted from RTs of block 9. The means of these two effects were divided by their inclusive standard deviation based on all responses in the relevant blocks (i.e., block 3, 5, 7 and 9), in order to control for individual variation (see Table 2.2 for overview of the blocks). The final score obtained is the IAT-D effect. In order to answer the research questions pertaining to DSE scores calculated according to methods d and e (see below), the raw scores of RSES and IAT were standardized.

Split-half reliability was used as a measure of internal consistency, using the Spearman-Brown prophecy formula (Brown, 1910; Spearman, 1910) in combination with the Pearson correlation between the D effect calculated from the two test blocks (no. 3 and 5) and the D effect calculated from the last two test blocks (no. 7 and 9).

Rosenberg Self-Esteem Scale (RSES): ESE was measured with the RSES (Franck et al., 2008; Rosenberg, 1965) in both groups: a 10-item self-report scale that measures personal evaluations of self-worth or self-acceptance with proven validity and reliability (Franck et al., 2008). Subjects are instructed to rate how much they strongly agree or disagree with each of the presented statements. The items are rated and scored on a 4-point Likert scale. Higher scores on the RSES (possible range 10-40) are indicative of more positive explicit self-esteem.

Table 2.2. Arrangement of the different IAT blocks

Block	Left label	Right label	No. of stimuli
1.	Negative	Positive	10
2.	Others	Me	10
3.	Others / Negative	Me / Positive	40
4.	Me	Others	10
5.	Me / Negative	Others / Positive	40
6.	Others	Me	10
7.	Others / Negative	Me / Positive	40
8.	Me	Others	10
9.	Me / Negative	Others / Positive	40

IAT = Implicit Association Test

Discrepant Self-Esteem (DSE): Former studies of DSE used different kinds of operationalizations of DSE (i.e., the extent that ISE and ESE differ). Overall, we found five different operationalizations of DSE in the literature and below we describe the way we used these in the present study:

- a. Cockerham et al. (2009): DSE was not measured by creating a "discrepant variable". Instead, in this study lower ESE in combination with higher ISE (each compared to a healthy group; $ESE_{clinical\ group} < ESE_{healthy\ group}$ and $ISE_{clinical\ group} > ISE_{healthy\ group}$) was interpreted as DSE (Zeigler-Hill, 2006). Group differences on ESE and ISE were analyzed using ANOVAs.
- b. Brinol, Petty & Wheeler (2006): A centered index of the extent of discrepancy between ESE and ISE was formed, taking the absolute value of the difference between the standardized explicit and implicit measures, subtracted by its sample mean. A dummy variable was formed, indicating the direction of the discrepancy (0 when $ESE > ISE$ and 1 when $ISE > ESE$). An interaction between the discrepancy index and the direction indicator

was used in a logistic regression analysis to assess whether the direction indicator influences the relationship between discrepancy index and the odds of the presence of an ED.

- c. Van Tuijl et al. (2014): DSE was measured by the interaction score between mean centered RSES and IAT raw scores. A logistic regression analysis was used to assess whether the main effects and interaction effect were indicative for the presence of an ED.
- d. Van Tuijl et al. (2016): The absolute difference between standardized scores of the IAT and RSES was computed for all participants. Two DSE variables were created: one for $ISE > ESE$; a 0 was assigned for participants where ESE was higher than ISE, and one for $ESE > ISE$; a 0 was assigned for participants where the reverse was true.
As such, an absolute difference score was derived on either $ISE > ESE$ or $ESE > ISE$, which had a score of 0 on the other discrepant self-esteem variable. Using a two-step logistic regression analyses, $ISE > ESE$ and $ESE > ISE$ were added in the first step, followed by ESE in the second step to classify participants either as belonging to the clinical or comparison group.
- e. Marissen et al. (2016): DSE was calculated by standardizing the scores (Z-scores) of RSES and IAT (De Raedt et al., 2006). Hereafter, distance between the standardized scores was computed by subtracting the standardized RSES scores from the standardized IAT scores. This calculation results in a score which indicates discrepancy between ESE and ISE. Lower scores of discrepancy indicate congruent scores between ISE and ESE, whereas higher scores imply a larger discrepancy between the two. ANOVA is used to assess the difference between the clinical and the comparison group.

Only method a. was used in a previous study on eating disorder psychopathology. The other described methods were used in a healthy population (method b), in a population of adolescents with symptoms of anxiety and depression (method c), in a clinical population with anxiety and depression (method d), and in a clinical population with narcissistic personality disorder (method e). Given this variety in operationalization of DSE in different fields of psychopathology, we choose not only to use the operationalization of Cockerham et al. (2009), but also other more recent operationalizations from other research fields than ED.

Procedure

First, participants completed a demographic information form. Subsequently, in another room, the IAT and the RSES were administered by using a laptop computer. After having received instruction for the IAT and the RSES, they were left alone by the researcher. After that, the comparison group filled in the SCL-90, the SCOFF and the EDE-Q. For the clinical group, the MINI was administered. Subsequently, the clinical group completed the SCL-90 and the EDE-Q. These self-report questionnaires were administered in the presence of the researcher and controlled for missing data at the end.

Statistical analysis

Following data screening, a Fisher Exact Test and two Mann-Whitney U tests were conducted to examine statistically significant differences between the clinical and the comparison group concerning gender, age and education level respectively. To assess the correlations between eating disorder pathology (EDE-Q), ESE and ISE, Spearman's rank correlation coefficients were calculated separately in both groups. Separate logistic regression analyses were used to examine whether the presence of an ED could be predicted by ESE and ISE scores. Moreover, separate linear regression analyses were performed to assess whether the severity of ED pathology could be predicted by ESE and ISE. When both ESE and ISE were significant independent predictors, ESE and ISE were investigated jointly.

In addition, logistic regression analyses were used to examine to what extent the five different operationalizations of DSE were predictive of the presence of an ED. There is no consistency between the five methods of DSE regarding the operationalization of the clinical features in the participants. Some studies used DSM diagnoses to indicate the clinical status of participants, while others made use of scores on questionnaires to measure disorder severity. To enhance comparability in DSE methods we chose to consistently use presence of diagnosis as outcome, i.e. the division of our participants into a clinical and comparison group.

The statistical analyses were performed using SPSS version 25.

Results

Group differences on demographic characteristics

Demographic characteristics of both groups are described in Table 2.1. With a Fisher Exact Test no statistically significant difference was found between the comparison group and the clinical group concerning gender ($p=.62$). A statistically significant difference was found between the comparison group ($Mdn=40.00$) and the clinical group ($Mdn=26.00$) concerning age ($U=471.00, p=.03$) and education level (Comparison: $Mdn=7.00$, experimental: $Mdn=5.00, U=377.50, p=.001$).

Correlations

Within the ED group ED psychopathology showed a strong and negative correlation with ESE ($r=-.56, p<.001$) and no significant correlation with ISE ($r=-.07, p=.69$). Furthermore, a strong and positive correlation was found between ESE and ISE ($r=.57, p<.001$). Within the comparison group ED psychopathology showed a comparable negative correlation with ESE ($r=-.49, p<.05$) and no significant correlation with ISE ($r=.18, p=.30$). But unlike the ED group, in the comparison group no significant correlation was found between ESE and ISE ($r=.13, p=.44$).

ESE and ISE

Means and standard deviations of all relevant variables are described in Table 2.3.

The Spearman-Brown split-half reliability of the IAT was adequate ($r_{sb} = .76$).

A logistic regression analysis showed that the presence of an ED diagnosis (MINI) was predicted by ESE ($OR = .60, 95\% CI [0.47, 0.76]$) and ISE ($OR = .19, 95\% CI [0.05, 0.68]$). When both ESE and ISE were investigated jointly, ESE remained significant ($OR = .58, 95\% CI [0.45, 0.76]$), however the prediction by ISE became non-significant ($OR = 2.56, 95\% CI [0.25, 25.89]$).

For the prediction of ED pathology (EDE-Q) with linear regression, ESE was found to be a statistically significant predictor ($B = -4.66, p < .001$). ISE was not found to be a significant predictor ($B = -20.28, p = .08$).

Table 2.3. Means and standard deviations

	ED		CG	
	M	SD	M	SD
EDE-Q	81.97	28.45	21.60	21.51
RSES	21.94	5.10	31.89	3.80
SCL-90 dep	42.61	15.78	20.49	4.27
IAT RT me+pos H1	845.72	222.91	948.91	233.81
IAT RT me+neg H1	1163.36	337.91	1215.52	477.39
IAT RT me+pos H2	804.75	157.41	916.28	245.19
IAT RT me+neg H2	964.70	233.68	1027.49	330.71
IAT D	0.37	0.45	0.62	0.33

ED = clinical group with an eating disorder; CG = comparison group;

EDE-Q: Eating Disorder Examination Questionnaire, RSES = Rosenberg Self-Esteem Scale,

SCL-90 dep = Self-report Symptom Checklist-90 depression scale, IAT RT = Implicit

Association Test reaction time (in milliseconds), IAT D = Implicit Association Test D effect

DSE

Analyses with five discrepant self-esteem methods were applied:

- Cockerham et al. (2009): There was a statistically significant difference between the clinical and the non-clinical group on ESE, with higher scores (Table 2.3) for the non-clinical group ($F(1, 71) = 89.55, p < .001$, partial $\eta^2 = .56$). Groups also differed on ISE ($F(1, 71) = 7.60, p < .05$, partial $\eta^2 = .09$), with higher scores for the non-clinical group.
- Brinol et al. (2016): A significant main effect of the direction of discrepancy was found ($OR = 6.46$, 95% CI [2.06, 20.31]), indicating that for ISE>ESE the odds for being in the clinical group is 6.46 times larger than for ESE>ISE. The absolute difference and its interaction with direction were not statistically significant.
- Van Tuijl et al. (2014): No statistically significant effect for the discrepancy measure was found ($OR = 0.94$, 95% CI [0.54, 1.61]).
- Van Tuijl et al. (2016): When ISE>ESE this was a significant predictor of being in the non-clinical group ($OR = 0.15$, 95% CI [0.03, 0.69]). ESE>ISE was not a significant predictor ($OR = 1.54$, 95% CI [0.52, 4.54]). After including ESE in the regression equation, ISE>ESE was no longer a significant predictor ($OR = 0.33$, 95% CI [0.03, 3.93]).

- e. Marissen et al. (2016): Discrepancy scores showed a statistically significant difference between the clinical ($M = 0.44$, $SD = 0.91$) and the non-clinical group ($M = -0.43$, $SD = 0.92$), $F(1, 71) = 16.31$, $p < .001$, partial $\eta^2 = .19$). The clinical group reported higher ISE than ESE, where the non-clinical group reported higher ESE than ISE.

Discussion

The main findings of the present study were: (a) Both a lower ESE as well as lower ISE predicted an ED diagnosis. When ESE and ISE were investigated jointly only ESE remained a significant predictor; (b) Low ESE was found to be significantly associated with a higher level of ED psychopathology. No relationship was found between ISE and the severity of ED psychopathology; and (c) Different methods for determining DSE yielded mixed outcomes concerning the association of DSE with the presence of an ED.

Previous studies focused mainly on the role of ESE in ED diagnosis. In these studies low ESE in ED patients compared to non-clinical comparison groups is a robust and consistent finding (Cockerham et al., 2009; Sassaroli et al., 2008). This finding is confirmed in the present study. In addition, we also found that lower ESE is associated with more severe ED psychopathology.

The previous study (Cockerham et al., 2009) found a more positive ISE in the ED group compared to the comparison group. We found an outcome in the opposite direction; in the ED population ISE was significantly lower compared to our comparison group. This finding is in line with most recent studies of ISE in relation to psychopathology where, when an association is found, lower ISE is related to more psychopathology (Franck, De Raedt, Dereu & Van den Abbeele, 2007; Glashouwer, Vroling et al., 2013; Risch et al., 2010; Ritter et al., 2013).

An explanation for this difference in outcome could be related to some problematic methodological characteristics of the study of Cockerham et al. (2009). The sample size was very small and the clinical group was a self-selected sample and therefore vulnerable for self-selection. Another possible reason could be that the current study included all EDs because of the assumed transdiagnostic role of self-esteem in ED (Fairburn et al., 2003). The clinical sample of Cockerham et al. (2009) included only BN and BED. It might be that the diversity between these diagnostic groups has influenced the results of the

present study. Unfortunately, our sample size is too small to analyze the role of ISE in AN, BN and BED separately. Future research could focus on the question to what extent ESE and ISE as putative transdiagnostic factors are related to the presence of an ED per se, or whether their relationship with ED psychopathology differs across ED diagnoses.

The less robust association of ISE and ED (compared to the association of ESE) could be related to characteristics of the measures used. The association of the RSES with (severity of) ED pathology may be overinflated because of common-method variance (EDE-Q) or criterion contamination (as low self-esteem may express itself in e.g. a negative body image). Moreover, the RSES and measures of ED pathology emphasize more trait-like aspects, while the IAT is based on reaction time responses in a particular testing situation hampering the identification of significant relation with pathology. In particular, definitions and measures of implicit cognitive processes relative to explicit cognitive processes need further refinement and validation, both in their psychometric properties and in their specific applications to psychopathology (De Houwer et al., 2009; Fiedler, Messner & Bluemke, 2006).

There is only one previous study of DSE in ED (Cockerham et al., 2009). In this study DSE was not measured by creating a separate “discrepant variable” but lower ESE in combination with higher ISE was interpreted as DSE (Zeigler-Hill, 2006). Studies of DSE in other populations created a separate “discrepant variable” in different ways. Furthermore, the outcome variable differed between studies (presence of diagnosis vs severity of psychopathology) and some studies corrected for depression severity while others did not. Because of these differences in operationalization, outcome variables and covariates, direct comparisons of study results are complicated. Therefore, we used five different operationalizations of DSE and a single outcome variable (presence of ED) to facilitate direct comparisons in outcomes. We found equivocal results in how DSE relates to the presence of an ED. With one operationalization (Marissen et al., 2016) we found a significant association between DSE and ED diagnosis, while we found no significant association with the other four operationalizations. Apparently, the way DSE is related to ED critically depends of which method is used and therefore the outcomes of studies of DSE in relation to psychopathology must be interpreted with the greatest caution. More definitive conclusions can only be drawn when the concept of DSE will become better defined and operationalized accordingly. Present operationalizations seem mainly driven by statistical considerations and are only loosely connected to a clear conceptualization of DSE.

There are some limitations to consider in the present study. First of all, because of the sample size of this study only relatively large effect sizes could be reliably detected. It is conceivable that more subtle differences between groups have been missed. For the same reason, this study did not examine differences among the subgroups AN, BN and BED. Future studies should examine differences among those subgroups to ascertain whether findings in the area of self-esteem and eating pathology apply across different ED categories. Furthermore, as the present study was powered to detect large between group effects, our examination of the predictive value of different operationalizations of DSE without correction for multiple testing to reduce the chances of Type I error must be seen as exploratory awaiting more stringent testing in future studies. A last limitation is that there was no inclusion of a second clinical control group. Therefore, no conclusion can be drawn about the specificity of our outcomes for the group of ED patients.

To conclude, especially low ESE seems to be associated with (severity of) ED psychopathology. Future research should also include ISE measures to further examine the clinical relevance of this variable. Although our cross-sectional study showed no unique relationship of ISE with (severity of) ED psychopathology, only longitudinal (treatment) studies can help to determine the prognostic value of ESE and ISE for (differentially) predicting outcome and their sensitivity to change. Such studies could also help to answer the question whether specific interventions are needed to modify ISE as a distinct processing mode or whether consistently reducing ESE eventually also affects ISE (Greenwald et al., 2002).

Disclosure of potential conflicts of interests

The authors declared no potential conflicts of interest.

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