



## RESEARCH ARTICLE

# Social Rank and Rejection Sensitivity as Mediators of the Relationship between Insecure Attachment and Disordered Eating

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## Abstract

**Aim:** The current study assessed a new interpersonal model for eating disorders (EDs), in which interpersonal rejection sensitivity (RS), appearance-based RS and social rank were hypothesised to mediate the relationship between insecure attachment and disordered eating.

**Method:** The sample comprised a clinical ED group (N = 122) and a control group (N = 622). Participants were asked to complete a number of self-report measures related to the variables of interest.

**Results:** Invariance testing indicated that the model was structurally non-invariant (different across groups). For the ED group, appearance-based RS and social rank were significant mediators of the relationship between insecure attachment and disordered eating. For the controls, the relationship between insecure attachment and disordered eating was mediated through multiple pathways involving interpersonal RS, appearance-based RS and social rank.

**Conclusion:** These findings may inform existing therapies such as interpersonal psychotherapy for EDs, by emphasising the role of sensitivity to rejection in the development and maintenance of disordered eating. Copyright © 2017 John Wiley & Sons, Ltd and Eating Disorders Association.

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## Keywords

eating disorder; disordered eating; social rank; rejection sensitivity; appearance

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Insecure attachment styles are commonly reported in disordered eating populations (Caglar-Nazali et al., 2014; Illing, Tasca, Balfour, & Bissada, 2010; Ward, Ramsay, & Treasure, 2000), and it is estimated that approximately 96–100% of women with eating disorders (EDs) have an insecure attachment style (Dakanalis et al., 2014). Several existing interpersonal models of EDs including the interpersonal functioning maintenance model (Arcelus, Haslam, Farrow, & Meyer, 2013), the ED-specific model of interpersonal psychotherapy (IPT-ED; Rieger et al., 2010) and the cognitive-interpersonal maintenance model of anorexia nervosa (Schmidt & Treasure, 2006; Treasure & Schmidt, 2013) have attempted to articulate the role of attachment in the development and maintenance of eating pathology. These models propose that insecure attachment is present before ED onset (Treasure & Schmidt, 2013) and may lead to a fear of negative social evaluation (Arcelus et al., 2013), which then becomes central in triggering ED symptoms such as restriction or binge eating and inevitably serves to maintain the disorder (Arcelus et al., 2013; Rieger et al., 2010). While there is some support for these propositions (e.g. Goddard et al., 2013), the majority of the proposed pathways have yet to

be empirically evaluated. Moreover, other constructs related to negative evaluation that may also account for the link between insecure attachment and EDs, such as social rank (Connan, Troop, Landau, Campbell, & Treasure, 2007) and rejection sensitivity (RS; Cardi, Di Matteo, Corfield, & Treasure, 2013), have not yet been incorporated into these models. Therefore, the current study tests an expanded form of the IPT-ED model, by incorporating these additional paths and testing a whole model rather than individual components in isolation. The model was tested across clinical ED and control samples to evaluate generalisability.

Attachment is gradually shaped by early experiences with attachment figures and eventually results in a fairly stable attachment style or orientation, which can be conceptualised as either secure or insecure (Bowlby, 1973; Fraley & Shaver, 2000; Main, Kaplan, & Cassidy, 1985). Attachment style influences how people perceive and react during various types of social interactions (Vrtička & Vuilleumier, 2012). Individuals with insecure attachment styles may rely heavily on relationships to validate their self-worth (Bartholomew & Horowitz, 1991). Alternatively, they may be socially avoidant and steer away from close

involvement with others to protect themselves against anticipated rejection (Bartholomew & Horowitz, 1991).

Insecure attachment may foster general concerns about negative social evaluation, defined by Rieger et al. (2010) as actual or perceived negative feedback regarding one's value to another individual or group. This negative social evaluation may include sensitivity to rejection and the perception that one is of low social rank. RS is considered an individual difference in the tendency to anxiously expect, readily perceive and overreact to real or imagined rejection (Downey & Feldman, 1996), while low social rank is associated with the perception of being inferior to others, less attractive, and an outsider (Gilbert, 1992). Within the context of ED symptoms, sensitivity to rejection may make individuals particularly vulnerable to negative comments about their appearance and/or motivate them to strive for the perceived ideal in order to avoid such criticism. Likewise, a general belief that one is of low social rank may generalise to beliefs about one's appearance, such that the individual perceives their appearance does not meet an objective standard, and thus, they are appearance dissatisfied and strive to attain the ideal (Pinto-Gouveia, Ferreira, & Duarte, 2014). In turn, these body image concerns may prompt ED behaviours.

Accumulated literature provides support for both RS and low social rank in the interpersonal difficulties experienced by individuals with EDs. RS is associated with the learnt expectation to selectively attend to hostile social cues and the tendency to misinterpret ambiguous social cues as rejection (Downey & Feldman, 1996). Cardi et al. (2013) found that lifetime ED patients showed an attentional bias to rejecting faces and difficulty disengaging attention from these stimuli. Further, this attentional bias to rejection was correlated with adverse childhood experiences. This altered attention pattern for social stimuli has also been found in neuropsychological studies of ED populations and is thought to involve overlapping social cognition and reward systems, which lead to a disruption of adaptive responses in social processing (Via et al., 2015).

While general RS may be expected to have negative outcomes, it is likely that RS specifically related to appearance is most closely aligned with ED outcomes (Rieger et al., 2010). Appearance-based RS is regarded as a dispositional personality processing system characterised by anxious concerns and expectations about being rejected specifically based on one's physical appearance (Park, 2007). Individuals with appearance-based RS associate physical flaws with rejection, resulting in preoccupation with their bodies and motivation to engage in behaviours to appear attractive to avoid rejection by others (Park, 2007). Appearance-based RS has been found to predict disordered eating in community samples (Park, 2007) and the tendency to make social comparisons based on appearance (Calogero, Park, Rahemtulla, & Williams, 2010).

In terms of social rank, ED patients commonly report features consistent with low social rank including an increased tendency for submission and the perception of being inferior to others (Connan et al., 2007; Troop, Allan, Treasure, & Katzman, 2003). These behaviours are also evident to a lesser extent in recovered ED patients, suggesting that it may be a trait vulnerability factor (Cardi, Di Matteo, Gilbert, & Treasure, 2014; Connan et al., 2007). Low social rank has also been shown to affect attentional processing in ED patients. Cardi et al. (2014) investigated the

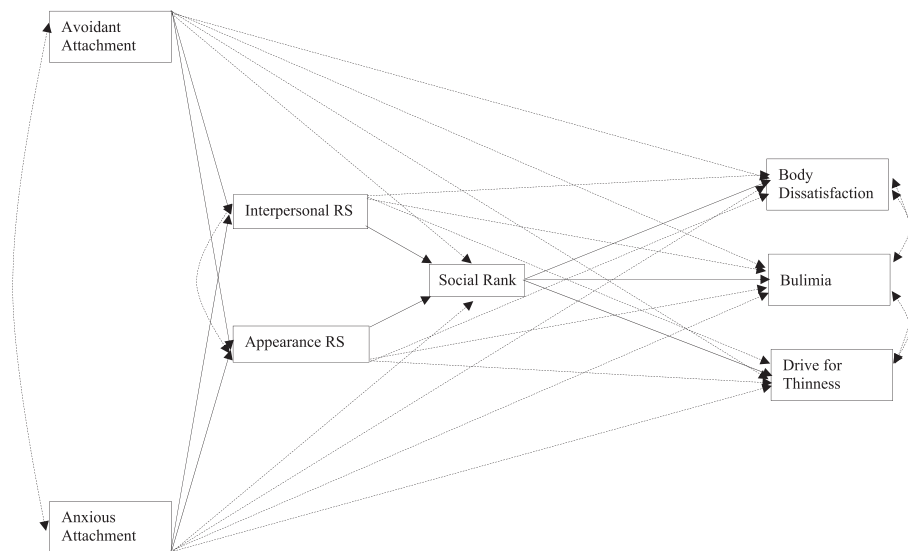
automatic processing of social rank-related stimuli in ED patients, recovered ED patients, and controls, and found that ED patients showed heightened sensitivity toward social rank-related stimuli compared with controls. Conversely, recovered ED patients showed an intermediate profile between currently ill ED patients and controls. Self-report data in the same study confirmed the behavioural findings, indicating that ED patients viewed themselves to be lower in social rank and had higher submissive behaviours and internal and external shame relative to controls. In a more recent study, Troop (2016) found that life events associated with a loss of social status (e.g. decreased reputation) were related to eating pathology, but only in women who perceived themselves to be low in social rank.

Taken together, accumulated findings suggest that, at the level of diagnosis, ED individuals are more likely to show insecure attachment styles and exhibit heightened RS and perceptions of low social rank. Insecure attachment has also been tied to specific ED symptoms (Illing et al., 2010), suggesting that there may be a direct, causal relationship between insecure attachment and ED symptom development and maintenance, rather than simply a non-causal comorbidity. Nevertheless, despite the proliferation of interpersonal models that emphasise the role of insecure attachment in the development of EDs, there have been few investigations into potential mediating social factors of this relationship. To date, there are no known studies that have tested the Arcelus et al. (2013) or the Rieger et al. (2010) interpersonal model, while existing studies (Goddard et al., 2011, 2013) of the cognitive-interpersonal maintenance model (Schmidt & Treasure, 2006) have only focused on specific components of the model. Moreover, while the pattern of findings for interpersonal maintaining factors is encouraging, there have been no known attempts to test the role of attachment in the aforementioned models. Thus, the current study expands extant interpersonal models and addresses gaps within the literature by examining the variables of attachment, interpersonal RS, appearance-based RS, social rank, and disordered eating concurrently. To do this, a new interpersonal model for EDs (outlined in Figure 1) was tested in which interpersonal RS, appearance-based RS and social rank were hypothesised to mediate the relationship between insecure attachment and disordered eating. The study utilised a clinical ED sample and a control sample to determine whether the relationships in the model differed across the two groups.

## METHOD

### Participants

Clinical ED participants were ascertained from different ED clinics and services across Australia. The sample consisted of 122 participants with a lifetime ED diagnosis (98% female,  $M$  age = 25.16 years,  $SD$  = 7.60) including 56 anorexia nervosa restricting (AN-R), 17 anorexia nervosa binge-purge (AN-BP), 17 bulimia nervosa (BN), 10 binge eating disorder (BED), and 22 other specified feeding and eating disorder (OSFED). Formal ED diagnosis was determined from psychiatrist report in tertiary settings according to the Diagnostic and Statistical Manual of Mental Disorders (DSM-5; American Psychiatric Association, 2013) criteria and by self-report in other settings. Participants varied in treatment stage, and 40 (32.79%) participants reported that they



**Figure 1.** All potential direct and indirect paths for the hypothesised model. Solid lines represent the tested path model. Dashed lines represent alternative paths to the outcome variables. RS, rejection sensitivity

were currently recovered from their ED. Average age of onset for the ED group was 15.23 years ( $SD = 4.32$ ). Average body mass index (BMI) was 20.98 ( $SD = 4.59$ ; healthy), and 18 of 122 (14.75%) participants reported a BMI over 25 (overweight/obese).

A comparison group was recruited from the community and a first year psychology university course. Control participants were screened for lifetime ED diagnosis and disordered eating behaviours using the Eating Disorders Examination Questionnaire (clinical cut-off  $> 4$ ; Fairburn & Beglin, 1994), and 45 participants were removed. A total of 622 control participants (79% female,  $M$  age = 22.01 years,  $SD = 8.63$ ) were included in the final analyses. Average BMI was 22.35 ( $SD = 4.70$ ; healthy), and 97 of 622 (15.59%) participants reported a BMI over 25 (overweight/obese). Ethical approval was obtained from a university in Melbourne and the hospitals from where the clinical ED sample was recruited.

## Measures

### Sociodemographics and clinical information

Information on participant age, height, weight, ethnicity, employment status, marital status, highest completed education, lifetime ED status, and age of ED onset were obtained. BMI was calculated as the ratio of weight (kg) to height squared ( $m^2$ ).

### Disordered eating

The Eating Disorder Inventory 3 (Garner, 2004) was used to assess disordered eating. The Eating Disorder Inventory 3 is a 91-item self-report measure that assesses symptomatology associated with EDs. The items are scored on a 6-point rating scale, which is then scored using a 0–4 system. For the current study, the *drive for thinness*, *body dissatisfaction*, and *bulimia* subscales of the ED risk composite were used. Cronbach's alpha for the current study was drive for thinness, .91, body dissatisfaction, .91, and bulimia, .88.

### Attachment style

Attachment style was assessed using the Revised Experiences in Close Relationships scale (ECR-R; Fraley, Waller, & Brennan, 2000). The ECR-R is based on a dimensional model of attachment and is a 36-item self-report measure that assesses *attachment anxiety* and *attachment avoidance* in current relationships. The ECR-R is often used as an indicator of attachment across the lifespan due to anticipated attachment stability formed from early experiences (Hazan & Shaver, 1987). The items are scored on a 7-point rating scale from 1 (strongly disagree) to 7 (strongly agree). Cronbach's alpha in the current study was attachment anxiety .94, and attachment avoidance .94.

### Interpersonal rejection sensitivity

Interpersonal RS was measured using the Rejection Sensitivity Questionnaire (RSQ; Downey & Feldman, 1996). The RSQ is an 18-item self-report measure that presents brief scenarios to assess RS along two dimensions: *rejection concern* (extent to which the participant would be concerned or anxious about a significant other's response to an important request) and *acceptance expectancy* (extent to which the participant would expect a significant other to honour their request). These dimensions are measured on separate scales. For each situation, respondents are asked to indicate rejection concern 1 (*very unconcerned*) to 6 (*very concerned*) and their acceptance expectancy 1 (*very unlikely*) to 6 (*very likely*). In accordance with the test authors' adoption of an expectancy-value model, RS was calculated by weighting the expected likelihood of rejection by the degree of concern over its occurrence. Specifically, expectancy of acceptance was reversed scored to index *expectancy of rejection* (expectancy of rejection =  $7 - \text{expectancy of acceptance}$ ). Total RS score was then calculated as the product of rejection concern and expectancy of rejection. The Cronbach's alpha for the overall RS scores in the current study was .85.

### Appearance-based rejection sensitivity

Appearance-based RS was measured using the Appearance-Based RS Scale (Appearance-RS Scale; Park, 2007). The Appearance-RS Scale is an 18-item self-report measure that presents brief scenarios to assess rejection based on appearance. Similar to the RSQ, the Appearance-RS Scale assesses rejection along the two dimensions of *rejection concern* and *rejection expectancy*. For each situation, respondents are asked to indicate: rejection concern 1 (*very unconcerned*) to 6 (*very concerned*) and their rejection expectancy 1 (*very unlikely*) to 6 (*very likely*). Overall appearance-based RS score was calculated by multiplying the degree of rejection concern with the degree of rejection expectancy. Cronbach's alpha for the overall RS scores in the current study was .96.

### Social rank

Self-perceived social rank was measured using the Social Comparison Rating Scale (SCRS; Allan & Gilbert, 1995). The SCRS is an 11-item self-report measure that uses a semantic differential methodology to measure a respondent's judgement of themselves in relation to others. The respondent is asked to rate from 1 to 10 on a series of bipolar constructs 'In relation to others I feel ...' 1 (*inferior*) to 10 (*superior*), 1 (*an outsider*) to 10 (*an insider*), 1 (*unattractive*) to 10 (*more attractive*) and so on. The SCRS is divided into three subscales *social comparison of rank*, *social comparison of group fit*, and *social comparison of attractiveness*. The items are added to derive a total score with low scores indicating low rank self-perceptions. Cronbach's alpha for the total score in the current study was .95.

### Procedure

Consenting adults were given access to an online questionnaire via QUALTRICS ONLINE SURVEY SOFTWARE. All participants read a consent form informing them of the voluntary nature of the study, before proceeding with the questionnaire. The participants were then asked to complete the sociodemographic questions and the self-report measures related to the variables of interest. Participants were informed that they could withdraw from the study at any time.

### Statistical analyses

All descriptive, correlational, and group difference-based analyses were conducted using IBM SPSS 24.0. Between-group analyses of the sociodemographic factors were conducted using chi-square and *t* tests to identify differences between the clinical ED sample and the control sample. Effect size was determined by Cohen's *d* with  $d = 0.2$  indicating a small effect,  $d = 0.5$  medium effect and  $d = 0.8$  indicating a large effect (Cohen, 1992). Two-tailed bivariate correlations were conducted separately for the clinical ED group and the control group. Correlations were derived between attachment, interpersonal RS, appearance-based RS, social rank, and disordered eating. Strength of the correlation was determined by Pearson's *r*, with  $.10 < r < .30$  indicating weak correlations,  $.30 < r < .50$ , medium correlations, and  $r > .50$  indicating a strong relationship (Cohen, 1992).

Path analysis using MPLUS software was conducted to test the hypothesised model in Figure 1. Structural invariance testing

was undertaken to investigate whether the relationships in the model were equivalent across the ED group and the control group. The model was controlled for age and gender because of the majority of the ED sample being female. Bootstrapping (5000 bootstraps) was used to assess mediation (Shrout & Bolger, 2002). Model modification was completed where improvements to the fit of the data could be obtained and if theoretically justifiable. Given that the  $\chi^2$  statistic is highly sensitive to large sample sizes (Tabachnick & Fidell, 2007), adequacy of model fit was also assessed via the comparative fit index (CFI), root-mean-square error of approximation (RMSEA), and standardised root-mean-square residual (SRMR). Following recommended criteria, CFI values above .95, RMSEA below .10, and SRMR below .08 were used to indicate acceptable fit to the data (Schermelel-Engel, Moosbrugger, & Muller, 2003). The model was first tested for the ED group and the control group separately where all parameters were allowed to vary across groups (unconstrained model). Next, the model was constrained, whereby regression paths for each group were constrained to be equal and compared with the unconstrained model. A model was deemed structurally invariant (i.e. equivalent across groups), if  $\Delta CFI$  was less than .01 (Cheung & Rensvold, 2002).

## RESULTS

### Sociodemographics

The sociodemographic variables for the overall sample, ED group and control group are presented in Table 1. Significant group differences were observed for age, BMI, ethnicity, education, marital status and employment. The clinical ED participants were significantly older, had a lower BMI, and were more commonly Caucasian, married, and unemployed than the controls. Conversely, the control participants were significantly younger, had a higher BMI, and were more commonly Asian, single, and current students.

### Differences in the variables of interest across groups

Table 2 outlines the group differences for the means for each of the variables of interest. Across all the variables, the clinical ED participants reported significantly higher levels of insecure attachment (both anxious and avoidant), RS (both interpersonal and appearance-based), disordered eating (drive for thinness, body dissatisfaction and bulimia), and lower social rank than the control group.

### Correlations among study variables

Correlations for all variables are presented separately for the ED sample and the controls in Table 3. For both the clinical ED group and the control group, attachment anxiety and attachment avoidance showed moderate significant positive relationships with the disordered eating variables. Interpersonal RS showed large positive significant associations with the disordered eating variables for the clinical ED group, while the control group showed moderate significant positive associations. Appearance-based RS showed large positive significant correlations with the disordered eating variables for both the clinical ED group and the control group. Finally, social rank showed medium to large negative relationships

**Table 1** Sociodemographic details of study participants

	Total ( <i>n</i> = 744)	EDs ( <i>n</i> = 122)	Controls ( <i>n</i> = 622)	<i>p</i>	$\chi^2$	Cramer's V
Mean (SD)						
Age (years)	22.53 (8.55)	25.16 (7.60)	22.01 (8.63)	<.001		
BMI	22.14 (4.71)	20.98 (4.59)	22.35 (4.70)	.005		
N (%)						
Ethnicity				<.001	87.672	.343
Caucasian	333 (44.80)	98 (80.30)	235 (37.80)			
Aboriginal/Torres Strait	1 (.10)	0	1 (.20)			
Asian	264 (35.50)	5 (4.10)	259 (41.60)			
European	79 (10.60)	12 (9.80)	67 (10.80)			
Middle-Eastern	10 (1.30)	0	10 (1.60)			
African	8 (1.10)	0	8 (1.30)			
Hispanic	2 (.30)	1 (.80)	1 (.20)			
Other	47 (6.30)	6 (4.90)	41 (6.60)			
Highest completed education				.049	7.864	.103
Primary	2 (.30)	1 (.80)	1 (.20)			
Secondary	370 (49.70)	64 (52.50)	306 (49.20)			
Tertiary	304 (40.90)	40 (32.80)	264 (42.40)			
Postgraduate	68 (9.10)	17 (13.90)	51 (8.20)			
Marital status				<.001	25.185	.184
Single	496 (66.70)	74 (60.70)	422 (67.80)			
In a relationship	190 (25.50)	28 (23.00)	162 (26.00)			
Married	46 (6.20)	15 (12.30)	31 (5.00)			
Separated	5 (.70)	4 (3.28)	1 (.20)			
Divorced	5 (.70)	1 (.82)	4 (.60)			
Widowed	2 (.30)	0	2 (.30)			
Employment				<.001	57.307	.278
Working full-time	74 (9.90)	20 (16.40)	54 (8.70)			
Working part-time	180 (24.20)	30 (24.60)	150 (24.10)			
Unemployed	47 (6.30)	24 (19.70)	23 (3.70)			
Student	443 (59.50)	48 (39.30)	395 (63.50)			

Note: *p* = *p* value (two-tailed). ED, eating disorder; BMI, body mass index.

**Table 2** Descriptive statistics and group difference tests

	ED ( <i>n</i> = 122)	Controls ( <i>n</i> = 622)	<i>t</i>	<i>p</i>	<i>d</i>
Mean (SD)					
Attachment anxiety	3.95 (1.15)	3.51 (1.20)	3.68	<.001	.37
Attachment avoidance	4.03 (1.26)	3.28 (1.10)	6.74	<.001	.63
Interpersonal RS	13.94 (6.33)	9.78 (3.72)	7.00	<.001	.80
Appearance-RS	21.08 (9.34)	14.13 (7.40)	7.76	<.001	.82
Social rank	40.13 (23.10)	63.74 (17.39)	-10.71	<.001	1.15
Drive for thinness	17.92 (8.24)	8.61 (7.15)	12.81	<.001	1.21
Body dissatisfaction	27.61 (10.61)	15.76 (9.54)	12.31	<.001	1.17
Bulimia	11.16 (9.36)	5.45 (5.89)	6.49	<.001	.79

Note: *p* = *p* value (two-tailed), *d* = Cohen's *d*. ED, eating disorder; RS, rejection sensitivity.

with disordered eating in the clinical ED group and medium inverse associations in the control group.

### Invariance testing

Invariance testing between the clinical ED group and the control group indicated that the model was structurally non-invariant

(i.e. different between groups). The fit for the unconstrained model was  $\chi^2 = 31.989$ , RMSEA = 0.067, SRMR = 0.025, and CFI = 0.991, and the fit for the constrained model was  $\chi^2 = 120.591$ , RMSEA = 0.065, SRMR = 0.070, and CFI = 0.968, indicating a worsening of fit ( $\Delta$ CFI = .023). Exploration of the modification indices suggested a large number of pathways that would need to be freed across the groups to loosen the invariance assumption, indicating that the relationships in the model differed significantly across the groups. Path analyses for each group are reported separately hereafter.

### Path analyses for the eating disorder group

For the clinical ED group, significant direct effects were observed for the following: (i) appearance-based RS and low social rank associated with drive for thinness; (ii) attachment avoidance, appearance-based RS and low social rank associated with body dissatisfaction; and (iii) appearance-based RS associated with bulimia (Table 4). Significant indirect effects were found for the following: (i) anxious attachment on drive for thinness through appearance-based RS; (ii) avoidant attachment on drive for thinness through social rank; and (iii) anxious attachment on body dissatisfaction through appearance-based RS (Table 5). The model accounted for 43.9% of the variance for drive for thinness

**Table 3** Bivariate correlations between insecure attachment, RS, appearance-based RS, social rank, and disordered eating variables

	AttAnx	AttAvoid	RS	ARS	SR	EDI_DT	EDI_BD	EDI_B
AttAnx	1	.475**	.591**	.521**	-.480**	.322**	.426**	.275**
AttAvoid	.341**	1	.402**	.282**	-.491**	.301**	.437**	.288**
RS	.470**	.318**	1	.734**	-.662**	.521**	.583**	.269**
ARS	.471**	.200**	.519**	1	-.572**	.610**	.687**	.327**
SR	-.446**	-.303**	-.474**	-.484**	1	-.529**	-.586**	-.267**
EDI_DT	.277**	.151**	.314**	.545**	-.239**	1	.755**	.472**
EDI_BD	.346**	.235**	.370**	.559**	-.443**	.709**	1	.464**
EDI_B	.306**	.229**	.333**	.455**	-.275**	.582**	.554**	1

Note: Correlations for the ED sample appear above the diagonal, and correlations for the control sample appear below the diagonal. AttAnx = attachment anxiety; AttAvoid = attachment avoidance; RS = interpersonal rejection sensitivity; ARS = appearance-based RS; SR = social rank; EDI\_DT = EDI drive for thinness subscale; EDI\_BD = EDI body dissatisfaction subscale; EDI\_B = EDI bulimia subscale.

\*\*Correlation is significant at the 0.01 level (2-tailed).

**Table 4** Unstandardised coefficients from analyses testing direct effect pathways between all variables for the clinical ED and control groups

Direct effect (independent variable → dependent variable)	ED (N = 122)			Controls (N = 622)		
	b	SE	p value (two-tailed)	b	SE	p value (two-tailed)
AttAnx → RS	2.855	0.524	<0.001	1.270	0.162	<0.001
AttAnx → ARS	4.069	0.687	<0.001	2.815	0.251	<0.001
AttAnx → social rank	-0.274	1.777	0.877	-2.631	0.655	<0.001
AttAnx → EDI_DT	-0.827	0.756	0.274	0.190	0.247	0.442
AttAnx → EDI_BD	-0.339	0.765	0.658	0.308	0.297	0.300
AttAnx → EDI_B	0.494	1.131	0.663	0.322	0.242	0.182
AttAvoid → RS	0.787	0.520	0.132	0.596	0.155	<0.001
AttAvoid → ARS	0.334	0.684	0.625	0.290	0.276	0.293
AttAvoid → social rank	-4.889	1.202	<0.001	-1.854	0.615	0.003
AttAvoid → EDI_DT	0.405	0.525	0.440	0.180	0.242	0.456
AttAvoid → EDI_BD	1.535	0.542	0.005	0.564	0.325	0.083
AttAvoid → EDI_B	0.978	0.845	0.247	0.517	0.234	0.027
RS → social rank	-1.476	0.331	<0.001	-1.003	0.202	<0.001
RS → EDI_DT	0.069	0.177	0.696	0.089	0.081	0.274
RS → EDI_BD	0.010	0.146	0.948	0.054	0.110	0.622
RS → EDI_B	-0.072	0.247	0.772	0.139	0.088	0.114
ARS → social rank	-0.477	0.224	0.033	-0.617	0.103	<0.001
ARS → EDI_DT	0.412	0.092	<0.001	0.500	0.040	<0.001
ARS → EDI_BD	0.617	0.116	<0.001	0.524	0.053	<0.001
ARS → EDI_B	0.265	0.133	0.047	0.281	0.041	<0.001
Social rank → EDI_DT	-0.086	0.036	0.015	0.029	0.019	0.117
Social rank → EDI_BD	-0.090	0.044	0.043	-0.105	0.024	<0.001
Social rank → EDI_B	-0.014	0.050	0.786	0.004	0.022	0.844

Note: b = unstandardised beta weight; SE = standard error; ED = eating disorder; AttAnx = attachment anxiety; AttAvoid = attachment avoidance; RS = interpersonal RS; ARS = appearance-based RS; EDI\_DT = EDI drive for thinness subscale; EDI\_BD = EDI body dissatisfaction subscale; EDI\_B = EDI bulimia subscale.

( $R^2=0.439$ ), 56.7% of the variance for body dissatisfaction ( $R^2=0.567$ ), and 19.8% of the variance for bulimia ( $R^2=.198$ ) for the ED group.

**Path analysis for the control group**

For the control group, significant direct effects were observed for the following: (i) appearance-based RS associated with drive for thinness; (ii) appearance-based RS and low social rank associated with body dissatisfaction; and (iii) avoidant attachment and

appearance-based RS associated with bulimia (Table 4). Significant indirect effects were found for the following: (i) anxious attachment on drive for thinness through appearance-based RS; (ii) anxious attachment on bulimia through appearance-based RS; (iii) anxious attachment on body dissatisfaction through multiple pathways involving interpersonal RS, appearance-based RS and social rank; and (iv) avoidant attachment to body dissatisfaction through interpersonal RS and social rank (Table 5). The model accounted for 31.6% of the variance for drive for thinness

**Table 5** Standardised coefficients from analyses testing indirect effect pathways from insecure attachment to disordered eating for the clinical ED group and the control group

Indirect effect [independent variable → mediator variable(s) → dependent variable]	ED			Controls		
	$\beta$	SE	<i>p</i> value (two-tailed)	$\beta$	SE	<i>p</i> value (two-tailed)
AttAnx → RS → EDI_DT	0.027	0.070	0.697	0.019	0.018	0.283
AttAnx → ARS → EDI_DT	0.233	0.064	<0.001	0.239	0.028	<0.001
AttAnx → social rank → EDI_DT	0.003	0.023	0.889	-0.013	0.009	0.146
AttAnx → RS → social rank → EDI_DT	0.050	0.027	0.062	-0.006	0.004	0.160
AttAnx → ARS → social rank → EDI_DT	0.023	0.016	0.139	-0.009	0.006	0.140
AttAnx → RS → EDI_BD	0.003	0.046	0.949	0.009	0.018	0.624
AttAnx → ARS → EDI_BD	0.271	0.072	<0.001	0.187	0.025	<0.001
AttAnx → social rank → EDI_BD	0.003	0.019	0.891	0.035	0.012	0.004
AttAnx → RS → social rank → EDI_BD	0.041	0.024	0.088	0.017	0.006	0.003
AttAnx → ARS → social rank → EDI_BD	0.019	0.013	0.158	0.023	0.006	<0.001
AttAnx → RS → EDI_B	-0.025	0.088	0.777	0.036	0.025	0.144
AttAnx → ARS → EDI_B	0.132	0.069	0.055	0.162	0.025	<0.001
AttAnx → social rank → EDI_B	0.000	0.011	0.968	-0.002	0.012	0.848
AttAnx → RS → social rank → EDI_B	0.007	0.027	0.798	-0.001	0.006	0.848
AttAnx → ARS → social rank → EDI_B	0.003	0.013	0.804	-0.002	0.008	0.846
AttAvoid → RS → EDI_DT	0.008	0.025	0.743	0.008	0.008	0.308
AttAvoid → ARS → EDI_DT	0.021	0.044	0.632	0.023	0.022	0.297
AttAvoid → social rank → EDI_DT	0.064	0.032	0.042	-0.008	0.006	0.179
AttAvoid → RS → social rank → EDI_DT	0.015	0.013	0.230	-0.003	0.002	0.184
AttAvoid → ARS → social rank → EDI_DT	0.002	0.005	0.681	-0.001	0.001	0.428
AttAvoid → RS → EDI_BD	0.001	0.016	0.956	0.004	0.008	0.635
AttAvoid → ARS → EDI_BD	0.025	0.050	0.625	0.018	0.017	0.298
AttAvoid → social rank → EDI_BD	0.052	0.029	0.072	0.023	0.009	0.016
AttAvoid → RS → social rank → EDI_BD	0.012	0.012	0.291	0.007	0.003	0.015
AttAvoid → ARS → social rank → EDI_BD	0.002	0.004	0.696	0.002	0.002	0.339
AttAvoid → RS → EDI_B	-0.008	0.032	0.810	0.016	0.010	0.121
AttAvoid → ARS → EDI_B	0.012	0.027	0.658	0.015	0.015	0.312
AttAvoid → social rank → EDI_B	0.009	0.034	0.794	-0.001	0.008	0.852
AttAvoid → RS → social rank → EDI_B	0.002	0.010	0.825	0.000	0.003	0.853
AttAvoid → ARS → social rank → EDI_B	0.000	0.003	0.914	0.000	0.001	0.886

Note:  $\beta$  = standardised beta weight, SE = standard error; ED = eating disorder; AttAnx = attachment anxiety; AttAvoid = attachment avoidance; RS = interpersonal RS; ARS = appearance-based RS; EDI\_DT = EDI drive for thinness subscale; EDI\_BD = EDI body dissatisfaction subscale; EDI\_B = EDI bulimia subscale.

( $R^2=0.316$ ), 38.6% of the variance for body dissatisfaction ( $R^2=0.386$ ), and 23.8% of the variance for bulimia ( $R^2=0.238$ ) for the control group.

## DISCUSSION

The current study represents the first concurrent investigation of attachment, interpersonal RS, appearance-based RS, and social rank within a disordered eating context. The study examined a new interpersonal model for eating pathology whereby interpersonal RS, appearance-based RS, and social rank were hypothesised to mediate the relationship between attachment and disordered eating. The model was compared with a clinical ED group and a control group and identified several points of differences across groups in how these variables interrelate.

### Differences in the variables of interest between the clinical group and controls

The results indicated that in line with previous research (Caglar-Nazali et al., 2014), the clinical ED group reported greater

attachment anxiety and attachment avoidance than the controls. In terms of interpersonal RS, the results showed that the clinical ED participants reported greater interpersonal RS compared with controls, providing support for the Cardi et al. (2013) behavioural study, which found that lifetime ED participants displayed an attentional bias to rejection compared with controls. The current findings also indicated that clinical ED participants reported greater appearance-based RS compared with controls, consistent with previous studies that have found positive associations between appearance-based RS and disordered eating (Park, 2007). In regard to social rank, the results indicated that, in line with previous research (Cardi et al., 2014; Troop et al., 2003), clinical ED participants perceived themselves to be lower in social rank than controls.

### Assessing the interpersonal model

The proposed model in clinical eating disorders

The results indicate that for individuals with clinical EDs, anxious and avoidant attachment styles were related to disordered

eating behaviour through different pathways. Appearance-based RS was a significant mediator of the relationship between anxious attachment and drive for thinness, and between anxious attachment and body dissatisfaction. Avoidant attachment was directly related to body dissatisfaction, and low social rank was a significant mediator of the relationship between avoidant attachment and drive for thinness. The current findings may be interpreted from an attachment perspective. As anxiously attached individuals are preoccupied with avoiding rejection in order to maintain closeness in relationships, they tend to be vigilant to rejection cues (Bartholomew & Horowitz, 1991). The extent to which RS affects psychological well-being depends on whether an individual has experienced rejection in a domain that they value (Ayduk, Downey, & Kim, 2001), and for clinical ED participants with anxious attachment, physical appearance appears to be a domain of value. Hence, appearance-based RS may trigger disordered eating behaviours such as drive for thinness or body dissatisfaction. These results offer support for the notion that appearance is particularly salient in clinical ED pathology (Rieger et al., 2010). Conversely, individuals with avoidant attachment did not experience the same relationship with appearance-based RS. Instead, individuals with avoidant attachment may be dissatisfied with their bodies and this may lead to a drive for thinness through self-perceived low social rank. This may be attributable to the nature of individuals with avoidant attachment, who tend to steer away from close involvement with others to protect themselves against anticipated rejection (Bartholomew & Horowitz, 1991). It could therefore be argued that because they do not want to get involved in intimate relationships, they are less concerned about rejection based on appearance. Rather, avoidant individuals may place their value in a social domain and therefore experience difficulty with their standing in the social rank. This is consistent with attachment literature that suggests that avoidant individuals have a positive self-evaluation but a negative evaluation of others (Ein-Dor, Mikulincer, & Shaver, 2011).

#### The proposed model in controls

The current results indicate a different pattern of relationships for the control group. Similar to the clinical group, appearance-based RS was a significant mediator of the relationship between anxious attachment and drive for thinness, and between anxious attachment and body dissatisfaction. In addition, for the controls, appearance-based RS was a significant mediator of the relationship between anxious attachment and bulimia, and avoidant attachment was directly related to bulimia. Further, unlike the clinical group, there were also significant paths involving interpersonal RS. Interpersonal RS was a mediator of the relationship between anxious attachment and body dissatisfaction, as well as between avoidant attachment and body dissatisfaction, where insecure attachment led to interpersonal RS, which in turn led to low social rank and subsequent disordered eating behaviour. Social rank was also implicated in different pathways for the control group, including in the relationship between anxious attachment and body dissatisfaction, and between avoidant attachment and body dissatisfaction. This is consistent with previous research in community samples (Troop & Baker, 2008), which found social rank to be predictive of disordered eating.

## Limitations

The present findings should be considered in light of a number of study limitations. Firstly, as the study was cross-sectional, the present findings do not establish causality. Future research should consider the use of longitudinal samples to further examine the mechanisms leading to disordered eating, including measurement of attachment earlier in life. Secondly, there are limitations within the literature in the conceptualisation and measurement of social rank. The terminology in the social rank field draws from social comparison theory, using terms such as 'unfavourable social comparison' to describe the perception that one is lower in social status than others. However, contrary to traditional social comparison research, social rank does not distinguish between the direction (upward, downward or lateral), or the frequency of the social comparison. There are two previous studies (Bamford & Halliwell, 2009; Ty & Francis, 2013) that have found that frequency of social comparison mediates the relationship between insecure attachment and disordered eating. Future research may further develop the current model by incorporating frequency of social comparisons, as this may act as a mechanism through which low perceived social rank leads to disordered eating behaviour. Finally, there are limitations pertaining to the clinical ED sample. The recruitment method allowed for the assessment of participants at different stages of their illness/recovery, and with 33% of the clinical group identifying themselves as recovered, this may have dampened effects in these analyses. Moreover, there may be issues with self-report data such as impression management, especially for clinical ED participants who may have been in treatment at the time. Further, the nature of the sample being predominantly AN-R may have influenced the results of the path analysis for the disordered eating variable of bulimia. This was due to recruitment from tertiary facilities where the majority of patients had AN-R diagnosis and were admitted because of their low weight and associated medical instability (Hay et al., 2014). Future studies may consider the use of a more balanced ED sample with equal distribution of participants across all ED subtypes.

## Clinical implications

The current study builds upon existing knowledge of the role of attachment in the development and maintenance of EDs. Given that high attachment anxiety has been found to be related to greater ED severity and poorer treatment outcomes across all ED subtypes (Illing et al., 2010), while reductions in attachment anxiety and avoidance have been associated with decreases in interpersonal problems (Maxwell, Tasca, Ritchie, Balfour, & Bissada, 2014), the current study highlights the need for early attachment interventions such as parenting programs and family therapy to improve attachment functioning in order to produce better outcomes for EDs. The current study also expands what is known about negative evaluation in EDs, particularly the maladaptive processing associated with RS and low social rank. These findings may inform existing therapies such as IPT-ED (Rieger et al., 2010) and cognitive behaviour therapy for EDs (CBT-E; Fairburn, 2008) by emphasising the roles of RS and social rank in the pathway to disordered eating behaviour and by challenging negative automatic thoughts associated with



rejection and social rank comparisons. Behavioural interventions aimed at correcting cognitive bias toward negative social cues (Cardi et al., 2015) have also shown some promise in EDs. Finally, the results indicate the need for clinical interventions to target self-esteem (Sloman, 2008), by expanding the individual's domains of value. In sum, future psychological interventions may therefore not only address underlying insecure attachment but also focus on the cognitive biases that trigger and maintain EDs.

## CONCLUSIONS

The current study sought to test a new interpersonal model for eating pathology whereby interpersonal RS, appearance-based

RS, and social rank were hypothesised to mediate the relationship between attachment and disordered eating. The results indicate that the relationships within the model differed across clinical ED participants and controls. For the ED group, appearance-based RS and social rank were significant mediators of the relationship between insecure attachment and disordered eating; while for the control group, the relationship between insecure attachment and disordered eating was mediated through multiple pathways involving interpersonal RS, appearance-based RS and social rank. Future research should continue to explore the constructs of RS and social rank, in order to better understand the development of interpersonal difficulties in EDs and to inform treatments targeting interpersonal functioning for those presenting with disordered eating.

## REFERENCES

- Allan, S., & Gilbert, P. (1995). A social comparison scale: Psychometric properties and relationship to psychopathology. *Personality and Individual Differences*, 19, 293–299. [https://doi.org/10.1016/0191-8869\(95\)00086-L](https://doi.org/10.1016/0191-8869(95)00086-L)
- American Psychiatric Association (2013). *Diagnostic and Statistical Manual of Mental Disorders* (5th ed.). Washington, DC: American Psychiatric Association.
- Arcelus, J., Haslam, M., Farrow, C., & Meyer, C. (2013). The role of interpersonal functioning in the maintenance of eating psychopathology: A systematic review and testable model. *Clinical Psychology Review*, 33, 156–167. <https://doi.org/10.1016/j.cpr.2012.10.009>
- Ayduk, O., Downey, G., & Kim, M. (2001). Rejection sensitivity and depressive symptoms in women. *Personality and Social Psychology Bulletin*, 27, 868–877. <https://doi.org/10.1177/0146167201277009>
- Bamford, B., & Halliwell, E. (2009). Investigating the role of attachment in social comparison theories of eating disorders within a non-clinical female population. *European Eating Disorders Review*, 17, 371–379. <https://doi.org/10.1002/erv.951>
- Bartholomew, K., & Horowitz, L. M. (1991). Attachment styles among young adults: A test of a four-category model. *Journal of Personality and Social Psychology*, 61, 226–244. [https://doi.org/10.1207/S15327957PSPR0602\\_03](https://doi.org/10.1207/S15327957PSPR0602_03)
- Bowlby, J. (1973). *Attachment and loss: Vol II, Separation: Anxiety and anger*. New York: Basic Books.
- Caglar-Nazali, H. P., Corfield, F., Cardi, V., Ambwani, S., Leppanen, J., Olabintan, O., et al. (2014). A systematic review and meta-analysis of 'systems for social processes' in eating disorders. *Neuroscience & Biobehavioral Reviews*, 42, 55–92. <https://doi.org/10.1016/j.neubiorev.2013.12.002>
- Calogero, R. M., Park, L. E., Rahemtulla, Z. K., & Williams, K. C. D. (2010). Predicting excessive body image concerns among British university students: The unique role of appearance-based rejection sensitivity. *Body Image*, 7, 78–81. <https://doi.org/10.1016/j.bodyim.2009.09.005>
- Cardi, V., Di Matteo, R., Corfield, F., & Treasure, J. (2013). Social reward and rejection sensitivity in eating disorders: An investigation of attentional bias and early experiences. *World Journal of Biological Psychiatry*, 14, 622–633. <https://doi.org/10.3109/15622975.2012.665479>
- Cardi, V., Di Matteo, R., Gilbert, P., & Treasure, J. (2014). Rank perception and self-evaluation in eating disorders. *International Journal of Eating Disorders*, 47, 543–552. <https://doi.org/10.1002/eat.22261>
- Cardi, V., Esposito, M., Bird, G., Rhind, C., Yiend, J., Schifano, S., et al. (2015). A preliminary investigation of a novel training to target cognitive biases towards negative social stimuli in anorexia nervosa. *Journal of Affective Disorders*, 188, 188–193. <https://doi.org/10.1016/j.jad.2015.08.019>
- Cheung, G. W., & Rensvold, R. B. (2002). Evaluating goodness-of-fit indexes for testing measurement invariance. *Structural Equation Modeling*, 9, 233–255. [https://doi.org/10.1207/S15328007SEM0902\\_5](https://doi.org/10.1207/S15328007SEM0902_5)
- Cohen, J. (1992). A power primer. *Psychological Bulletin*, 112(1), 155–159. <https://doi.org/10.1037/0033-2909.112.1.155>
- Connan, F., Troop, N., Landau, S., Campbell, I. C., & Treasure, J. (2007). Poor social comparison and the tendency to submissive behavior in anorexia nervosa. *International Journal of Eating Disorders*, 40, 733–739. <https://doi.org/10.1002/eat.20427>
- Dakanalis, A., Timko, C. A., Zanetti, M. A., Rinaldi, L., Prunas, A., Carrà, G., et al. (2014). Attachment insecurities, maladaptive perfectionism, and eating disorder symptoms: A latent mediated and moderated structural equation modeling analysis across diagnostic groups. *Psychiatry Research*, 215, 176–184. <https://doi.org/10.1016/j.psychres.2013.10.039>
- Downey, G., & Feldman, S. I. (1996). Implications of rejection sensitivity for intimate relationships. *Journal of Personality and Social Psychology*, 70, 1327–1343. <https://doi.org/10.1037/0022-3514.70.6.1327>
- Ein-Dor, T., Mikulincer, M., & Shaver, P. R. (2011). Attachment insecurities and the processing of threat-related information: Studying the schemas involved in insecure people's coping strategies. *Journal of Personality and Social Psychology*, 101, 78–93. <https://doi.org/10.1037/a0022503>
- Fairburn, C. G. (2008). *Cognitive behavior therapy and eating disorders*. New York: Guilford Press.
- Fairburn, C. G., & Beglin, S. J. (1994). Assessment of eating disorders: Interview or self-report questionnaire? *International Journal of Eating Disorders*, 16(4), 363–370. [https://doi.org/10.1002/1098-108X\(199412\)16:4<363::AID-EAT2260160405>3.0.CO;2-#](https://doi.org/10.1002/1098-108X(199412)16:4<363::AID-EAT2260160405>3.0.CO;2-#)
- Fraley, R. C., & Shaver, P. R. (2000). Adult romantic attachment: Theoretical developments, emerging controversies, and unanswered questions. *Review of General Psychology*, 4, 132–154. <https://doi.org/10.1037/1089-2680.4.2.132>
- Fraley, R. C., Waller, N. G., & Brennan, K. A. (2000). An item-response theory analysis of self-report measures of adult attachment. *Journal of Personality and Social Psychology*, 78, 350–365. <https://doi.org/10.1037/0022-3514.78.2.350>
- Garner, D. M. (2004). *Eating disorder inventory-3 (EDI-3). Professional manual*. Odessa, FL: Psychological Assessment Resources.
- Gilbert, P. (1992). *Depression: The evolution of powerlessness*. New York: Guilford.
- Goddard, E., Macdonald, P., Sepulveda, A. R., Naumann, U., Landau, S., Schmidt, U., et al. (2011). Cognitive interpersonal maintenance model of eating disorders: Intervention for carers. *The British Journal of Psychiatry*, 199, 225–231. <https://doi.org/10.1192/bjp.bp.110.088401>
- Goddard, E., Salerno, L., Hibbs, R., Raenker, S., Naumann, U., Arcelus, J., et al. (2013). Empirical examination of the interpersonal maintenance model of anorexia nervosa. *International Journal of Eating Disorders*, 46, 867–874. <https://doi.org/10.1002/eat.22172>
- Hay, P., Chinn, D., Forbes, D., Madden, S., Newton, R., Sugden, L., et al. (2014). Royal Australian and New Zealand College of Psychiatrists clinical practice guidelines for the treatment of eating disorders. *Australian & New Zealand Journal of Psychiatry*, 48, 977–1008. <https://doi.org/10.1177/0004867414555814>
- Hazan, C., & Shaver, E. (1987). Conceptualizing romantic love as an attachment process. *Journal of Personality and Social Psychology*, 52, 511–524. <https://doi.org/10.1037/0022-3514.52.3.511>
- Illing, V., Tasca, G. A., Balfour, L., & Bissada, H. (2010). Attachment insecurity predicts eating disorder symptoms and treatment outcomes in a clinical sample of women. *The Journal of Nervous and Mental Disease*, 198, 653–659. <https://doi.org/10.1097/NMD.0b013e3181ef34b2>
- Main, M., Kaplan, N., & Cassidy, J. (1985). Security in infancy, childhood, and adulthood: A move to the level of representation. *Monographs of the Society for Research in Child Development*, 50, 66–104. <https://doi.org/10.2307/3333827>
- Maxwell, H., Tasca, G. A., Ritchie, K., Balfour, L., & Bissada, H. (2014). Change in attachment insecurity is related to improved outcomes 1-year post group therapy in women with binge eating disorder. *Psychotherapy*, 51, 57–65. <https://doi.org/10.1037/a0031100>
- Park, L. E. (2007). Appearance-based rejection sensitivity: Implications for mental and physical health, affect, and motivation. *Personality and Social Psychology Bulletin*, 33, 490–504. <https://doi.org/10.1177/0146167206296301>
- Pinto-Gouveia, J., Ferreira, C., & Duarte, C. (2014). Thinness in the pursuit for social safeness: An integrative model of social rank mentality to explain eating psychopathology. *Clinical Psychology & Psychotherapy*, 21, 154–165. <https://doi.org/10.1002/cpp.1820>

- Rieger, E., Van Buren, D. J., Bishop, M., Tanofsky-Kraff, M., Welch, R., & Wilfley, D. E. (2010). An eating disorder-specific model of interpersonal psychotherapy (IPT-ED): Causal pathways and treatment implications. *Clinical Psychology Review, 30*, 400–410. <https://doi.org/10.1016/j.cpr.2010.02.001>
- Schermelleh-Engel, K., Moosbrugger, H., & Müller, H. (2003). Evaluating the fit of structural equation models: Tests of significance and descriptive goodness-of-fit measures. *Methods of Psychological Research Online, 8*, 23–74.
- Schmidt, U., & Treasure, J. (2006). Anorexia nervosa: Valued and visible. A cognitive-interpersonal maintenance model and its implications for research and practice. *British Journal of Clinical Psychology, 45*, 343–366. <https://doi.org/10.1348/014466505X53902>
- Shrout, P. E., & Bolger, N. (2002). Mediation in experimental and nonexperimental studies: New procedures and recommendations. *Psychological Methods, 7*, 422–445.
- Slovan, L. (2008). A new comprehensive evolutionary model of depression and anxiety. *Journal of Affective Disorders, 106*, 219–228. <https://doi.org/10.1016/j.jad.2007.07.008>
- Tabachnick, B. G., & Fidell, L. S. (2007). *Using multivariate statistics* (5th ed.,). Boston: Allyn & Bacon.
- Treasure, J., & Schmidt, U. (2013). The cognitive-interpersonal maintenance model of anorexia nervosa revisited: A summary of the evidence for cognitive, socio-emotional and interpersonal predisposing and perpetuating factors. *Journal of Eating Disorders, 1*, 13–23. <https://doi.org/10.1186/2050-2974-1-13>
- Troop, N. A. (2016). Social rank, rank-related life events and eating pathology. *European Eating Disorders Review, 24*, 75–77. <https://doi.org/10.1002/erv.2386>
- Troop, N. A., Allan, S., Treasure, J. L., & Katzman, N. (2003). Social comparison and submissive behavior in eating disordered patients. *Psychology and Psychotherapy: Theory, Research and Practice, 76*, 237–249. <https://doi.org/10.1348/147608303322362479>
- Troop, N. A., & Baker, A. H. (2008). The specificity of social rank in eating disorder versus depressive symptoms. *Eating Disorders, 16*, 331–341. <https://doi.org/10.1080/10640260802115993>
- Ty, M., & Francis, A. J. P. (2013). Insecure attachment and disordered eating in women: The mediating processes of social comparison and emotion dysregulation. *Eating Disorders: The Journal of Treatment & Prevention, 21*, 154–174. <https://doi.org/10.1080/10640266.2013.761089>
- Via, E., Soriano-Mas, C., Sánchez, I., Forcano, L., Harrison, B. J., Davey, C. G., et al. (2015). Abnormal social reward responses in anorexia nervosa: An fMRI study. *PLoS One, 10*, e0133539. <https://doi.org/10.1371/journal.pone.0133539>
- Vrtička, P., & Vuilleumier, P. (2012). Neuroscience of human social interactions and adult attachment style. *Frontiers in Human Neuroscience, 6*, 212. <https://doi.org/10.3389/fnhum.2012.00212>
- Ward, A., Ramsay, R., & Treasure, J. (2000). Attachment research in eating disorders. *British Journal of Medical Psychology, 73*, 35–51. <https://doi.org/10.1348/000711200160282>