**Effects of Family Functioning on Eating Pathology and Psychosocial Quality of Life:**

**The Mediating Role of Self-Esteem**

First author :

Olga Theodoropoulou

NKUA, Eating Disorders Unit, 1st Department of Psychiatry, Eginition Hospital, vas Sofias 74, Athens Greece, 11528

olga22ps@yahoo.gr

ORCID: https://orcid.org/0000-0003-0485-8509

Second author:

Kathryn Jane Gardner

School of Psychology and Computer Science, University of Central Lancashire, Preston, Lancashire, PR1 2HE, UK

kjgardner@uclan.ac.uk

Third author:

Noreen Caswell

School of Psychology and Computer Science, University of Central Lancashire, Preston, Lancashire, PR1 2HE, UK

ncaswell1@uclan.ac.uk

Fourth author:

Lynda Holyoak

School of Psychology and Computer Science, University of Central Lancashire, Preston, Lancashire, PR1 2HE, UK

lholyoak@uclan.ac.uk

Fifth author:

Fragiskos Gonidakis

NKUA, Eating Disorders Unit, 1st Department of Psychiatry, Eginition Hospital, vas Sofias 74, Athens Greece, 11528

fragoni@yahoo.com

**Declaration of conflicting interests**
The authors declared no potential conflicts of interest with respect to the research, authorship and/or publication of this article.

**Funding**
The authors received no financial support for the research, authorship and/or publication of this article.

**Data availability statement**
The data that support the findings of this study are available from the corresponding author upon reasonable request.

**Acknowledgements**

The first author would like to thank the staff of: 1) Eating Disorders outpatient unit at Eginition Hospital of National and Kapodistrian University of Athens, Medical School, Psychiatric Department; 2) 18 ANO Outpatient ED Department of Dafni Psychiatric Hospital, Athens, Greece; 3) the ANASA Day Care Center for ED outpatients in Athens, Greece.

**Effects of Family Functioning on Eating Pathology and Psychosocial Quality of Life: The Mediating Role of Self-Esteem**

## Highlights

- Family dysfunction did not have a direct effect on eating pathology in patients and controls
- Trait self-esteem mediated all proposed relationships between family dysfunction and eating pathology/psychosocial QoL in patients and controls
- Family dysfunction had a direct effect on psychosocial QoL in patients and controls
- Low trait self-esteem is more important than family dysfunction in eating pathology development


## Abstract

**Objective**: Family dysfunction and self-esteem play an important role in the development of eating disorders (EDs), but this role has not been sufficiently examined regarding eating pathology and psychosocial quality of life (QoL), which often remains unchanged even after ED symptoms reduce. The purpose of this study was to therefore assess the mediating role of self-esteem between family dysfunction and both eating pathology and psychosocial QoL in ED patients and controls.

**Method**: 154 female adult ED patients and 154 female healthy adult controls were recruited from Athens, Greece, and self-reported measures were used to assess family dysfunction, eating pathology, self-esteem, and psychosocial QoL. Structural equation modelling (SEM) was employed to test the mediation hypotheses.

**Results**: For both the ED and control groups, family dysfunction levels did impact eating pathology, but only through self-esteem. Family dysfunction, self-esteem, and eating pathology had a direct effect on both groups' psychosocial QoL.

**Conclusion**: Self-esteem's important role in EDs was confirmed in both groups, along with its sensitivity to family dysfunction. We propose a parsimonious yet comprehensive

theoretical model of the role of family dysfunction and self-esteem in EDs which future studies should further investigate longitudinally and in other population groups.

*Keywords*: eating disorders, self-esteem, family dysfunction, psychosocial QoL, mediation

## Introduction

Eating disorders have a complicated and multifaceted etiology, frequently resulting in serious medical problems, significant functional impairment, low quality of life, and a poor prognosis (Ragnhildstveit et al., 2022). Additionally, longitudinal studies have demonstrated that ED patients maintain low QoL even after years of treatment and symptom remission (Padierna et al., 2002) with no significant differences in reported QoL across the spectrum of ED diagnosis (de la Rie et al., 2005). These data imply that psychological rather than physiological variables affect QoL in ED patients. Even though empirical studies (e.g. Cerniglia et al., 2017; Colmsee et al., 2021; Holtom-Viesel & Allan, 2014; Woodward et al., 2019) have identified common factors in the development and maintenance of EDs, such as family dysfunction and low self-esteem, the exact mechanism through which these two elements influence eating pathology and quality of life has yet to be determined (Colmsee et al., 2021; Erriu et al., 2020), but is crucial to understand when designing prevention programmes and therapeutic strategies.

### *Family dysfunction and eating disorders*

Family dysfunction is consistently associated with eating pathology irrespective of ED type or sub-type (e.g. Cerniglia et al., 2017; Holtom-Viesel & Allan, 2014), indicating that it is a transdiagnostic factor in EDs. Leading theories of EDs have focused on unresolved familial conflicts to explain the origins of ED symptoms (e.g. Bruch, 1982; Minuchin et al, 1975). There has been criticism that these theories lack empirical support (Eisler, 2005), yet the weight of evidence suggests that dysfunction within the family predates ED onset and that an ED diagnosis further exacerbates dysfunction within the family (e.g. Allen et al., 2014; Holtom-Viesel & Allan, 2014; Karwautz et al., 2003), potentially creating a bi-directional relationship. In addition, a systematic review of seventeen studies has shown that families with an ED member have difficulties in areas of family functioning (Holtom-Viesel & Allan,

2014); this includes difficulties in those areas identified by the McMaster model of family functioning (Epstein et al., 1978) (problem solving, communication, roles, affective responsiveness, affective involvement, behaviour control and general functioning). According to this model, family functioning is a complex phenomenon involving many aspects, such as managing problems, enhancing personal development, effective communication, and expressing and managing emotions.

*Self-esteem and eating disorders*

Trait self-esteem is a global and unidimensional construct of one's personal judgment regarding one's worth (Rosenberg, 1965). Low trait self-esteem has been associated with eating pathology in a range of clinical and non-clinical studies and samples across all ED subtypes (e.g. Cervera et al., 2003; Newns et al., 2003; Woodward et al., 2019), making it a transdiagnostic factor. Low self-esteem is considered a major risk factor for the onset, maintenance, and relapse of EDs (Biney et al., 2019) and is characteristic of girls who subsequently develop an ED (Cervera et al., 2003). This means that low self-esteem predates the development of eating pathology and may therefore be a cause of EDs. Low self-esteem has also been associated with low QoL in ED patients (de la Rie et al., 2005), family dysfunction (Rezaei-Dehaghani et al., 2015), and poor psychosocial functioning (Ciao et al., 2015). However, despite, the empirical support between self-esteem and disordered eating, the direction of relationships between self-esteem and EDs is unclear (Adamson et al., 2019).

*Self-esteem as a mediator of the relationship between family dysfunction and eating disorders*

The familial environment is crucial for the development of the self (Harter, 2012) and adversely effects trait self-esteem into adulthood (Orth, 2018). Moreover, studies indicate that people with dysfunctional families report higher levels of body dissatisfaction and a higher drive for thinness, which are both risk factors for ED development (Knobloch-Westerwick &

Crane, 2012; Leung et al., 1996). Additionally, body dissatisfaction is associated with low self-esteem (Balcetis et al., 2013). It could be concluded that family dysfunction may lead to the development of an ED through lowering self-esteem, leading to body dissatisfaction/drive for thinness, and dieting and associated behaviours (use of diuretics, laxatives, self-induced vomiting). Body image and appearance, along with self-esteem, belong to the psychological domain of QoL, indicating that family dysfunction could have a negative effect on that domain via low self-esteem. This suggests an association between family dysfunction and low self-esteem with respect to both ED development and psychosocial QoL, given that family dysfunction and low self-esteem have emerged as risk factors for eating pathology (Anokhina, 2015; Wisotsky et al., 2003).

*Study rationale and aims*

In sum, the empirical literature provides ample support for relationships between family dysfunction, trait self-esteem, eating pathology, and QoL. Trait self-esteem may operate as a major risk factor, as well as an aetiological factor for EDs (Adamson et al., 2019; Biney et al., 2019) and has previously emerged as a mediator between family functioning and eating pathology in a non-clinical population (Kroplewski et al., 2019). However, research is lacking regarding the mediating role of self-esteem between family dysfunction and both eating pathology and psychosocial QoL in a clinical population. No study has explored these psychological constructs in a combined theoretical model in ED patients. This includes considering the impact of these constructs on ED patients' psychosocial QoL as an important therapeutic outcome.

This study examined the mediating role of trait self-esteem between family functioning and ED, and family functioning and psychosocial QoL in ED patients, comparing the results to a non-clinical healthy comparison group. It was hypothesised that trait self-

esteem mediates the relationship between family dysfunction and ED/psychosocial QoL in both groups, with the comparison group being used to support interpretation of the results.

## Method

### Study Design

Structural equation modeling was used to assess associations between dimensions of family functioning (problem solving, communication, roles, general functioning, affective responsiveness, affective involvement and behavioural control) and a) ED pathology (restraint, eating concern, shape concern, and weight concern), and b) family functioning and psychosocial quality of life (psychological health and social relationships), with global self-esteem tested as a potential mediator within those relationships.

### Participants

The optimum number of participants was 150 per group for detection of small to medium effect size in mediation (Fritz & MacKinnon, 2007) with α level of .05 and power of .80. A total of 308 Greek adult female participants (154 ED patients and 154 controls) completed the survey. Of the patients, 45 (14.6%) were diagnosed with AN (18 with the restricting type, 18 with the purging type, 9 with other specified AN); 60 (19.5%) were diagnosed with the BN (58 with BN, 2 with other specified BN); 49 (15.9%) were diagnosed with BED. The 154 ED outpatients had a mean age of 31.12 years (*SD* = 10.82) and were drawn from ED outpatient units in Athens, Greece. The 154 controls had a mean age of 32.80 years (*SD* = 10.33) and were drawn from the community. Scores for the controls on the Eating Disorder Examination Questionnaire (EDE-Q) (Fairburn & Beglin, 2008) indicated neither the presence of an ED nor sub-clinical ED (see description of the EDE-Q) as would be expected for a nonclinical sample. Eating disorder patients met the criteria for diagnosis according to DSM-V (American Psychiatric Association, 2013) as assessed by clinicians upon admission to the outpatient units (e.g. clinical interview, EDE-Q, MMPI-2 SCHID I, SCHID II, PDQ etc.). The ED patients were selected based on their medical record

information excluding those with any kind of psychiatric comorbidity. Participation for both groups was voluntary and chronic mental or somatic illness was an exclusion criterion as this could affect psychosocial QoL. For a full description of the population's socio-demographic and clinical characteristics see Tables 1 and 2 respectively.

Table 1.

*Descriptive statistics in means (standard deviation) and frequencies (%) of the ED patients' (both by diagnostic group and as a whole) and the control group's socio-demographics.*

| | AN PATIENTS n = 45 (14.6%) | BN PATIENTS n = 60 (19.5%) | BED PATIENTS n = 49 (15.9%) | EATING DISORDER PATIENTS n = 154 (50%) | CONTROLS n = 154 (50%) |
|---|---|---|---|---|---|
| EDUCATIONAL LEVEL (total years of study) | | | | | |
| *Primary school (6 years)* | 0(0%) | 0(0%) | 0(0%) | 0(0%) | 1 (.6%) |
| *High school gymnasium (9 years)* | 0(0%) | 0(0%) | 1 (2%) | 1 (.6%) | 1 (.6%) |
| *High school lyceum (12 years)* | 10 (22.2%) | 11 (18.3%) | 11 (22.4%) | 32 (20.8%) | 43 (27.9%) |
| *After school (14 years)* | 5 (11.1%) | 4 (6.7%) | 10 (20.4%) | 19 (12.3%) | 11 (7.1%) |
| *College (16 years)* | 28 (62.2%) | 34 (56.7) | 20 (40.8%) | 82 (53.2%) | 62 (40.3%) |
| *Post graduate studies (17–19 years)* | 2 (4.4%) | 11 (18.3%) | 7 (14.3%) | 20 (13%) | 36 (23.4%) |
| WORKING STATUS | | | | | |
| *Full time* | 10 (22.2%) | 18 (30%) | 22 (44.9%) | 50 (32.5%) | 93 (60.4%) |
| *Part time* | 4 (8.9%) | 11 (18.3%) | 8 (16.3%) | 23 (14.9%) | 14 (9.1%) |
| *Not working (retired (or householder)* | 1 (2.2%) | 3 (5%) | 10 (20.5%) | 14 (9.1%) | 7 (4.5%) |
| *Not working (unemployed)* | 4 (8.9%) | 10 (16.7%) | 6 (12.2%) | 20 (13%) | 7 (4.5%) |

| | AN PATIENTS n = 45 (14.6%) | BN PATIENTS n = 60 (19.5%) | BED PATIENTS n = 49 (15.9%) | EATING DISORDER PATIENTS n = 154 (50%) | CONTROLS n = 154 (50%) |
|---|---|---|---|---|---|
| *Not working (college student)* | 26 (57.8%) | 18 (30%) | 3 (6.1%) | 47 (30.5%) | 33 (21.4%) |
| | AN PATIENTS | BN PATIENTS | BED PATIENTS | EATING DISORDER PATIENTS | CONTROLS |
| *MARITAL STATUS* | | | | | |
| *Single* | 41 (91.1%) | 52 (86.7%) | 19 (38.8%) | 112 (72.7%) | 97 (63%) |
| *Married* | 4 (8.9%) | 5 (8.3%) | 21 (42.9%) | 30 (19.5%) | 50 (32.5%) |
| *Separated/divorced* | 0(0%) | 3 (5%) | 9 (18.3%) | 12 (7.8%) | 7 (4.5%) |
| *PARENT* | | | | | |
| *Yes* | 3 (6.7%) | 5 (8.3%) | 28 (57.1%) | 36 (23.4%) | 48 (31.2%) |
| *No* | 32 (93.3%) | 55 (91.7%) | 21 (42.9%) | 118 (76.6%) | 106 (68.8%) |
| *SIBLINGS* | | | | | |
| *Yes* | 42 (93.3%) | 53 (88.3%) | 42 (85.7%) | 137 (89%) | 138 (89.6%) |
| *No* | 3 (6.7%) | 7 (11.7%) | 7 (14.3%) | 17 (11%) | 16 (10.4%) |
| *LIVING STATUS* | | | | | |
| *Alone* | 8 (17.8%) | 17 (28.3%) | 5 (10.2%) | 30 (19.5%) | 31 (20.1%) |
| *Not alone* | 37 (82.2%) | 43 (71.7%) | 44 (89.8%) | 124 (80.5%) | 123 (79.9%) |
| *PEOPLE LIVING WITH* | | | | | |
| *Family members (e.g. parents, siblings)* | 31 (68.9%) | 32 (53.3%) | 18 (36.6%) | 81 (52.7%) | 62 (40.4%) |
| *Boyfriend/spouse, kids* | 6 (13.3%) | 10 (16.7%) | 26 (53.2%) | 42 (27.2%) | 59 (38.2%) |
| *Roommate/friend* | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 4 (2.6%) |
| *None* | 8 (17.8%) | 18 (30%) | 5 (10.2%) | 31 (20.1%) | 29 (18.8%) |

*Note*: The ED subgroups are mentioned for informative reasons, and they were not used in the analyses.

Table 2.

*Descriptive statistics in means (standard deviation) and frequencies (%) of the ED patients' (both by diagnostic group and as a whole) and the control group's clinical data .*

| | AN PATIENTS<br>n = 45 (14.6%) | BN PATIENTS<br>n = 60 (19.5%) | BED PATIENTS<br>n = 49 (15.9%) | EATING DISORDER PATIENTS<br>n = 154 (50%) | CONTROLS<br>n = 154 (50%) |
|---|---|---|---|---|---|
| | Mean (SD) or frequency % | Mean (SD) or frequency % | Mean (SD) or frequency % | Mean (SD) or frequency % | Mean (SD) or frequency % |
| Current age (years) | 24.60 (5.66) | 27.88 (7.30) | 41.06 (11.16) | 31.12 (10.82) | 32.80 (10.33) |
| Age of ED onset (years) | 17.48 (3.37) | 16.88 (4.24) | 18.18 (8.15) | 17.47 (5.60) | 0 (0) |
| Duration of illness (years) | 7.12 (6.00) | 11.00 (8.22) | 22.88 (12.89) | 13.65 (.92) | 0 (0) |
| Hospitalised for ED | | | | | |
| *Yes* | 8 (17.8%) | 1 (1.7%) | 3 (6.1%) | 12 (7.8%) | 0 (0%) |
| *No* | 37 (82.2%) | 59 (98.3%) | 46 (93.9%) | 142 (92.2%) | 154 (100%) |
| Times hospitalised for ED | .31 (.73) | .02 (.13) | .12 (.53) | .14 (.51) | 0 (0) |
| Perceived health status | | | | | |
| Very bad | 3 (6.7%) | 2 (3.3%) | 1 (2%) | 6 (3.9%) | 1(.6%) |
| Bad | 2 (4.4%) | 3 (5%) | 3 (6.1%) | 8 (5.2%) | 0(0%) |
| Neither good nor bad | 13 (28.9%) | 9 (15%) | 10 (20.4) | 32 (20.8%) | 11 (7.1%) |

| | AN PATIENTS<br>n = 45 (14.6%) | BN PATIENTS<br>n = 60 (19.5%) | BED PATIENTS<br>n = 49 (15.9%) | EATING DISORDER PATIENTS<br>n = 154 (50%) | CONTROLS<br>n = 154 (50%) |
|---|---|---|---|---|---|
| Good | 19 (42.2%) | 32 (53.3%) | 22 (44.9%0 | 73 (47.4%) | 67 (43.5%) |
| Very good | 8 (17.8%) | 14 (23.3%) | 13 (26.5%) | 35 (22.7%) | 75 (48.7%) |
| Body weight (kg) | 47.40 (7.93) | 61.76 (12.95) | 91.08 (25.82) | 66.89 (24.52) | 61.20 (9.53) |
| BMI | 17.54 (2.42) | 22.16 (4.10) | 33.47 (9.53) | 24.41 (8.88) | 22.19 (3.18) |
| Body Discrepancy Index | .69 (1.91) | 2.20 (1.55) | 2.65 (1.25) | 1.90 (1.76) | .97 (1.19) |

*Note*: The duration of illness is calculated by subtracting the age of ED onset from the current age. The body discrepancy index indicated body dissatisfaction by subtracting the ideal body shape from the perceived body shape. The negative scores indicate a desire to be bigger, and positive scores indicate a desire to be thinner. A score of zero indicated no body dissatisfaction. In this table, only positive scores are observed. The ED subgroups are mentioned for informative reasons, and they were not used in the SEM analyses.

## Measures

*1) World Health Organization Brief Quality of Life Assessment Scale (WHOQOL-BREF)*

The WHOQOL-BREF is a 26-item self-administered instrument (World Health Organization, 1996) examining QoL in four domains: Physical Health, Psychological Health, Social Relationships, and Environment. Items are scored on a 5-point Likert scale with higher scores indicating better QoL. Internal consistency in this sample for the two scales was: Psychological health .86 for patients and .77 for controls; Social relationships .72 for patients and .70 for controls.

*2) Rosenberg Self-esteem scale (RSES)*

The Rosenberg Self-esteem Scale (Rosenberg, 1965) is a 10-item self-reported measure of explicit global self-esteem. Items are rated on a 4-point Likert scale and the higher the total score, the higher the self-esteem. Internal consistency in the current study was .90 for patients and .82 for controls.

*3) McMaster Family Assessment Device (FAD)*

The McMaster Family Assessment Device (Epstein et al., 1983) is a 60-item self-reported screening instrument rated on a 4-point Likert scale that distinguishes between healthy and unhealthy family functioning. There are seven clinically relevant dimensions,: Problem Solving, Communication, Roles, Affective Responsiveness, Affective Involvement, Behaviour Control, and General Functioning. The first six scales assess the six dimensions of the MMFF and the seventh scale, General Functioning, is composed of different questions assessing the overall health or pathology of the family (Epstein et al., 1983). High scores indicate greater family dysfunction. Internal consistency in this sample was: Problem Solving .80 for patients and .72 for controls; Communication .88 for patients and .76 for controls; Roles .72 for patients and .75 for controls; Affective Responsiveness .85 for patients and .81 for controls; Affective Involvement .77 for patients and .69 for controls; Behaviour Control .70 for patients and .51 for controls; General Functioning .92 for patients and .87 for controls.

*4) Eating Disorder Examination Questionnaire (EDE-Q 6)*

The Eating Disorder Examination Questionnaire 6.0 (EDE-Q) (Fairburn & Beglin, 2008) is used to assess the core psychopathology of eating disorders. It is composed of 28 items and three types of data: a) four subscale scores (Restraint, Eating Concern, Shape Concern and Weight Concern), b) a global score which is the average of the four subscale scores, and c) frequency data on key eating and compensatory behaviours. The scores are reported as

means and standard deviations ranging from 0 to 6. A cut-off of four or more (≥ 4) indicates clinical significance for each subscale and for the global score (Fairburn & Beglin, 2008). An empirically derived threshold of ≥ 2.30 is used for the Global score to indicate eating disturbances but not an eating disorder (Arigo et al., 2014). These thresholds were used to ensure that the control group did not have an ED. Internal consistency in this sample was: Restraint .81 for patients and .79 for controls; Eating Concern .78 for patients and .77 for controls; Shape Concern .88 for patients and .88 for controls; Weight Concern .75 for patients and .80 for controls.

*5) Sociodemographic and Relevant Clinical Information*

The demographic sheet included questions about personal and contextual factors, such as sociodemographic characteristics, psychological and physical complaints at present (that could possibly affect their QoL), body satisfaction, BMI ($kg/m^2$), duration of illness and age of illness onset, times hospitalized and perceived seriousness of health condition.

**Procedure**

The study received approval from the University ethics committee and the first author received written permission from the ED outpatients' units to recruit participants. Controls were drawn from Athens colleges and the community. All study participants provided informed consent.

**Data Analytic Strategy**

Structural Equation Modeling was performed for each of the participant groups to explore the hypothesized mediational models. The maximum likelihood chi-square ($\chi^2$) statistic was used to evaluate both the measurement and structural models. However, it is sensitive to sample size and may lead to model rejection, even when the model is properly

specified (Hooper et al., 2008). Thus, several fit indices were used: the comparative fit index (CFI), the Tucker-Lewis index (TLI), and the root mean square of approximation (RMSEA). These measures of fit are the most frequently recommended (Jackson et al., 2009). Cut off levels for good fit model were: RMSEA ≤ .06 - ≤ .08 (Schreiber, 2008); CFI > .90; TLI > .95 (Hu & Bentler, 1999).

The hypothesized structural models for patients and controls are shown in Figures 1 and 2 respectively, displaying the path coefficients for the standardized direct and indirect effects. The examination of the standardized residuals and modifications indices revealed no high values, and the standardized residuals were random without systematic pattern, indicating that both conceptual models are viable. Standardized regression weights were used to interpret the direct effects and the significance of the indirect effects was based on bias-corrected bootstrap method confidence intervals (Cheung, 2009; MacKinnon et al., 2004). The RMediation program (Tofighi & MacKinnon, 2011) was also used to further test the mediational effects of the significant indirect paths to minimize the possibility of the BC confidence intervals being a Type 1 error.

## Results

### Data Screening and Preliminary Analyses

Data were analyzed with the use of IBM SPSS Statistics 21.0 (IBM Corporation, 2012) and AMOS 22 (Arbuckle, 2013) and screened for missing values, data entry errors, outliers and normality (Tabachnick & Fidell, 2007). Univariate and multivariate outliers were corrected for each statistical analysis. This resulted in the deletion of one multivariate outlier in the control group. Normality was then explored, leading to the transformation of the four EDEQ scales for the control group.

**Exploratory analyses:** Exploratory analyses were conducted to check for differences in the mean scores of the variables both between the ED subtypes and between the ED patients and controls, to identify how distinct the groups are and whether any similarities in the SEM models might be due to overlap in the control and ED groups. Notably, the ED subtypes were not analysed, adopting a transdiagnostic perspective regarding the factors related to the onset and maintenance of eating pathology. However, it is important to check for differences in the study variables among the ED subtypes to clarify if a specific diagnostic type was responsible for the SEM results. The assumptions for all the following analyses were met.

**ED subtypes:** One-way analysis of variance (ANOVA) found no significant differences among the ED subtypes regarding self-esteem, family functioning, and psychosocial QoL, suggesting that it was unlikely that the mean score of a specific ED subtype affected the direct and indirect effects in the SEM model for the ED patient group (see supplementary Table A).

**ED patients and controls:** One-way ANOVA found that the ED group had significantly lower self-esteem, higher family dysfunction, and lower psychosocial QoL compared to healthy controls (see Table 3). Together with the SEM results, these findings

suggest that the ED and control group differ in levels of severity across the measured constructs, but differ little in terms of the nature of the theoretical model that can explain relationships between these constructs.

Table 3.

*Means, standard deviations and one-way analyses of variance (ANOVA) in self-esteem, family functioning and psychosocial QoL between ED patients and controls.*

| Measure | ED patients | | Controls | | *Welch F* (df) | *F (1,305)* | *p* | *est.* $\omega^2$ | $\omega^2$ |
|---|---|---|---|---|---|---|---|---|---|
| | *M* | *SD* | *M* | *SD* | | | | | |
| Self-esteem | 15.00 | 5.55 | 20.73 | 4.03 | $107.14^{***}$ (1, 279.198) | | .000 | .26 | |
| General family functioning | 2.42 | .64 | 1.92 | .38 | $69.68^{***}$ (1, 249.544) | | .000 | .18 | |
| Problem solving | 2.37 | .54 | 2.05 | .36 | $37.82^{***}$ (1, 265.987) | | .000 | .11 | |
| Communication | 2.46 | .61 | 2.08 | .37 | $44.53^{***}$ (1, 252.361) | | .000 | .12 | |
| Roles | 2.49 | .40 | 2.34 | .37 | | $12.93^{***}$ | .000 | | .04 |
| Affective responsiveness | 2.52 | .68 | 2.16 | .53 | $26.37^{***}$ (1, 288.047) | | .000 | .08 | |
| Affective involvement | 2.26 | .52 | 2.03 | .38 | $19.85^{***}$ (1, 281.480) | | .000 | .06 | |
| Behaviour control | 2.21 | .41 | 2.00 | .29 | $25.85^{***}$ (1, 278.199) | | .000 | .07 | |
| Psychological health (QoL) | 11.24 | 3.06 | 14.61 | 1.98 | $131.17^{***}$ (1, 261.805) | | .000 | .30 | |
| Social relationships (QoL) | 11.76 | 3.74 | 14.95 | 2.89 | $69.57^{***}$ (1, 287.715) | | .000 | .18 | |

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

*Note*: ED patients: n = 154, controls: n =153

*Measurement Models*

In the structural model, the latent variable of family functioning is the exogenous variable, the observed variable of self-esteem is the mediator, and the two latent variables of psychosocial QoL and eating pathology are the endogenous variables. Measurement models were first assessed in both patients and controls to evaluate the appropriateness of the latent variables.

**ED Patients:** the model fit the data well: $\chi^2(62, N = 154) = 107.823$, $p < .001$, CFI = .97, TLI = .96, RMSEA = .07. All standardized factor loadings between the measured variables and their respective latent variables were significant ($p < .001$) and ranged from .48 to .97. The correlations between the latent variables were as follows: family functioning and psychosocial QoL was $r = -.44$, $p < .001$; psychosocial QoL and eating pathology was $r = -.60$, $p < .001$; family functioning and eating pathology was $r = .23$, $p = .012$.

**Controls:** the model was an adequate fit to the data: $\chi^2(62, N = 153) = 120.532$, $p < .001$, CFI = .95, TLI = .94, RMSEA = .08. All standardized factor loadings between the measured variables and their respective latent variables were significant ($p < .001$) and ranged from .52 to -.98. The correlation between family functioning and psychosocial QoL was $r = -.61$, $p < .001$; psychosocial QoL and eating pathology was $r = -.42$, $p < .001$ and the correlation between family functioning and eating pathology was not significant ($p > .05$).

*Structural Model Analyses*

The structural model examines the relationships between the theoretically proposed latent constructs. Prior to the SEM analysis examination of the two models, relationships between all variables were calculated using Pearson Product Moment coefficients (two tailed), as shown in supplementary Tables B (patients) and C (controls), respectively.

**ED Patients**: Model fit indices show that the hypothesised model (Figure 1) fits the data well: $\chi^2(72, N = 154) = 121.257$, $p < .001$, CFI =.97, TLI =.96, RMSEA =.07. The direct path from family functioning to self-esteem was significant ($\beta = -.33$, $p < .001$), meaning that when family functioning increased by 1 standard deviation then self-esteem decreased by.33 standard deviations. The direct paths from self-esteem to eating pathology ($\beta = -.48$, $p < .001$), and from self-esteem to psychosocial QoL ($\beta = .58$, $p < .001$) were also significant, meaning that when self-esteem increased by 1 standard deviation then psychosocial QoL increased by.58 standard deviations. The other significant direct paths were from family functioning to psychosocial QoL ($\beta = -.18$, $p = .001$) and from eating pathology to psychosocial QoL ($\beta = -.25$, $p < .001$). All the direct paths have a post hoc power 1. The two latter direct paths were not part of the mediation hypothesis, but all possible paths were examined in the model. It is interesting to note that there was no significant direct effect from family functioning to eating pathology and the post hoc power of this path is 1. In summary, the direct paths in the clinical sample revealed that: i) high levels of family dysfunction leads to low self-esteem and poor psychosocial QoL, ii) that low levels of self-esteem lead to higher levels of ED and poor QoL, and iii) high eating pathology results in poor QoL.

The indirect path from family functioning to eating pathology with self-esteem as a mediator was significant (standardized indirect effect =.16, bias-corrected bootstrap lower CI =.068 and upper CI =.253, $p = .002$). In addition, the indirect effect of family functioning to psychosocial QoL with self-esteem as a mediator was significantly different from zero (standardized indirect effect = -.25, bias-corrected bootstrap lower CI = -.360 and upper CI = -.129, $p = .002$). The RMediation program was used (Tofighi & MacKinnon, 2011) to further test the mediational effects using the distribution-of-product method. The unstandardised coefficients and standard errors of the *a* and *b* paths between family functioning and self-esteem and between self-esteem and eating pathology were entered into the program and

yielded lower and upper 95% confidence limits of.155 and.575 providing a significant indirect effect. Next, the unstandardized coefficients and standard errors of the a and b paths between family functioning and self-esteem and between self-esteem and psychosocial QoL were entered into RMediation resulting in lower and upper confidence limits of -2.006 and -0.658, thus displaying a significant indirect effect. The results are consistent with those of a partial mediation effect given a direct path from family functioning to self-esteem in the presence of significant indirect effects both for eating pathology and psychosocial QoL. This means that self-esteem partially mediated the relationship between family dysfunction and ED/psychosocial QoL.

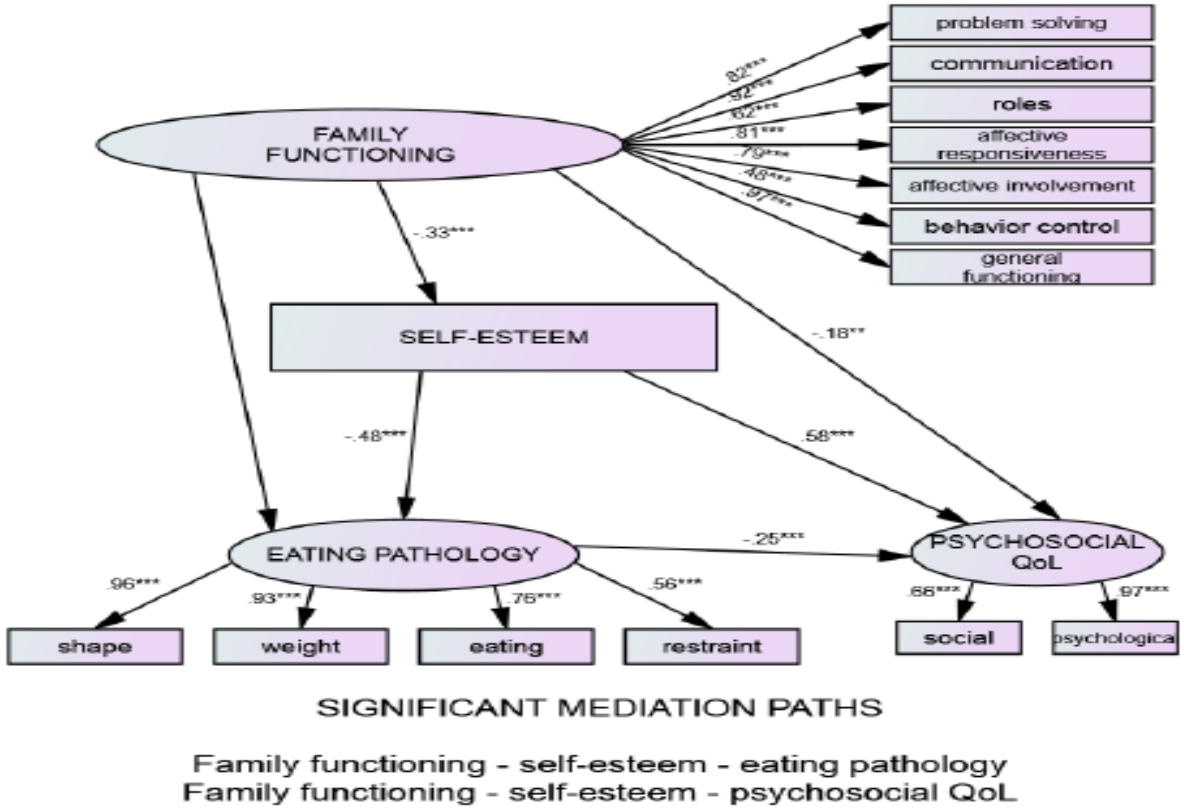
**Controls:** Model fit indices show that the hypothesised model (Figure 2) fits the data adequately: $\chi^2(72, N = 153) = 128.054$, $p < .001$, CFI =.96, TLI =.95, RMSEA =.07. The direct path from family functioning to self-esteem was significant ($\beta = -.43$, $p < .001$) and so were the direct paths from self-esteem to eating pathology ($\beta = .38$, $p < .001$) and from self-esteem to psychosocial QoL ($\beta = .46$, $p < .001$). The other direct paths that were significant were from eating pathology to psychosocial QoL ($\beta = .22$, $p = .003$) and from family functioning to psychosocial QoL ($\beta = -.35$, $p < .001$). As with the patients' model, there was no direct effect of family functioning on eating pathology even though the post hoc power was 1 in all direct paths. Summarising, the direct paths revealed that high levels of family dysfunction lead to low self-esteem and poor psychosocial QoL, and low self-esteem leads to poor QoL. However, high levels of ED seem here to lead to higher levels of QoL and high self-esteem to high eating pathology, something inconsistent not only with literature but to psychological mechanisms. It could be explained as a suppressor variable effect for the self-esteem - ED path, a common problem reported in the literature with multiple regression and latent variables of SEM models (Maassen & Bakker, 2001), like the ED variable in this case. The answer to ED-QoL issue may be the transformation of ED scales for controls. The

correlations of ED scales, prior to transformation, with QoL were all negative, as expected. Post-transformation correlation of these variables led to mixed results with QoL (some negative and some positive within the same scales).

The indirect path from family functioning to eating pathology with self-esteem as a mediator was significant (standardized indirect effect = -.17, bias-corrected bootstrap lower CI = -.267 and upper CI = -.082, $p$ =.001). The indirect path from family functioning to psychosocial QoL with self-esteem as a mediator was also significant (standardized indirect effect = -.22, bias-corrected bootstrap lower CI = -.330 and upper CI = -.133, $p$ =.001). The unstandardized coefficients and standard errors of the a and b paths between family functioning and self-esteem and between self-esteem and eating pathology were entered into RMediation and yielded lower and upper 95% confidence limits of -0.651 and -0.178 providing a significant indirect effect. Next, the unstandardized coefficients and standard errors of the a and b paths between family functioning and self-esteem and between self-esteem and psychosocial QoL were entered resulting in lower and upper confidence limits of -2.455 and -0.785, producing a significant indirect effect. The results are consistent with those of a partial mediation effect given a direct path from family functioning to self-esteem in the presence of significant indirect effects both for eating pathology and psychosocial QoL. In other words, self-esteem partially mediated the relationship between family dysfunction and ED/psychosocial QoL.

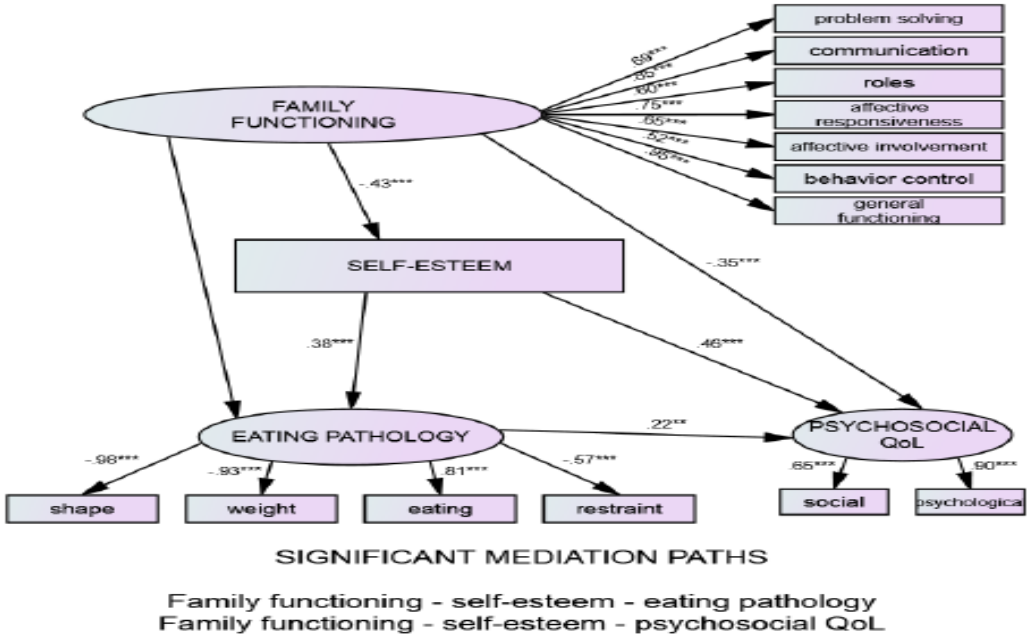
Comparing the beta values between ED patients and controls it is evident that greater family dysfunction had a stronger effect on lowering self-esteem [($\beta$ = -.43, $p$ <.001) vs ($\beta$ = -.33, $p$ <.001)] and QoL [($\beta$ = -.35, $p$ <.001) vs ($\beta$ = -.18, $p$ =.001)] for controls, and low self-esteem had a stronger effect on lowering QoL for patients [($\beta$ =.58, $p$ <.001) vs ($\beta$ =.46, $p$ <.001)].

**Figure 1**. Structural equation model testing the mediational effect of self-esteem on the relationships between family functioning and eating pathology, and family functioning and psychosocial QoL in ED patients.




*$p$ <.05, **$p$ <.01, ***$p$ <.001
*Note:* Standardised paths shown are significant.

**Figure 2.** Structural equation model testing the mediational effect of self-esteem on the relationships between family functioning and eating pathology, and family functioning and psychosocial QoL in the control group.




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

*Note:* Standardised paths shown are significant.

## Discussion

The results provide evidence to suggest that self-esteem is an important mediator between family dysfunction and eating pathology, as well as between family dysfunction and psychosocial QoL, in both ED patients and healthy controls from the general population. These results extend the limited studies in the field (Kroplewski et al., 2019) by testing an original model that includes these key theoretically pertinent factors. Therefore, this study provides insight into the possible mechanism that explains the link between family dysfunction and EDs. It is argued that family dysfunction leads to a significant erosion of self-esteem, resulting in eating pathology.

Both low self-esteem and family dysfunction are considered risk factors for ED development, and they are reported characteristics of people diagnosed with EDs (Adamson et al., 2019; Cerniglia et al., 2017). In the current study, self-esteem appears to play a more direct role in EDs than family dysfunction, supporting previous theories that self-esteem uniquely contributes to ED development (Silverstone, 1992). Moreover, self-esteem is affected by family functioning and might, therefore, become a risk factor for poor psychosocial QoL as well as ED development, further highlighting the potential lifelong significance of self-esteem. The fact that self-esteem had a direct effect on EDs in both populations also supports this argument. Yet, longitudinal studies will need to confirm the causality. The importance of self-esteem remained unchanged in our study, regardless of the ED subtype, that is, we found no difference in self-esteem levels of AN, BN, or BED patients.

Family functioning had a direct effect on self-esteem and psychosocial QoL and an indirect effect on eating pathology and psychosocial QoL via self-esteem, both in ED patients and controls. Theoretically, this suggests that trait self-esteem is an

important factor, sensitive to family dysfunction regardless of psychopathology. This result was strengthened by the group comparison tests, which showed significant differences between ED patients and controls regarding self-esteem, psychosocial QoL, and family dysfunction, indicating that the similarity in the theoretical models' was not simply the result of similar mean scores for these variables. It also indicates that these psychological constructs are important at different levels of severity, but fundamentally they operate in the same manner when it comes to theoretical pathways and relationships. These findings also validate other studies in which family dysfunction has been associated with low self-esteem (Rezaei-Dehaghani et al., 2015) and low psychosocial QoL (Ciao et al., 2015). Additionally, this study confirms that the effect of the familial environment is enduring and observed in adulthood (Orth, 2018). Family functioning did not have a direct effect on eating pathology in either population, supporting Le Grange and colleagues' (2010) position that family cannot be considered the sole or primary risk factor for ED development. Yet, family functioning did have a small direct effect on both populations' psychosocial QoL, indicating that family dysfunction has an important effect on psychological health and social relationships in adult life, independent of a clinical diagnosis.

The direct effect of EDs on psychosocial QoL is in accordance with the relevant literature (Ura & Preston, 2015). These findings, along with previous evidence of psychosocial functioning impairment in EDs (Bentley et al., 2015), highlight the overlooked psychosocial aspects of QoL. Given that QoL is not improved even after ED remission (e.g. de la Rie et al., 2005; Pohjolaine et al., 2016), it can be hypothesised that factors besides ED symptoms are more responsible for poor QoL, and these factors should be addressed in treatment. One such factor could be self-esteem, as the results indicate that it had a stronger direct effect on QoL than

eating pathology and family dysfunction in both groups. In line with other studies (de la Rie et al., 2005), the ED subgroups did not differ in their perceived QoL.

The fact that there was no significant difference in family functioning and self-esteem between the ED subtypes supports the transdiagnostic nature of these factors. Overall, the findings further suggest that both self-esteem and family dysfunction are important for people without an ED, thus highlighting the importance of self-esteem in relation to ED prevention.

**Clinical and Theoretical Implications**

Self-esteem emerged as a mediator between family dysfunction, ED, and QoL and had a direct relationship with these variables, suggesting that self-esteem enhancement sessions could be used in addition to typical ED therapy. Moreover, according to a review of ED prevention programmes (Stice et al., 2013), most effective programmes target body dissatisfaction and the thin ideal internalisation (Stice et al., 2013). It would be beneficial to include self-esteem as a possible cause of the thin ideal internalisation and body dissatisfaction as this would increase the efficacy of the prevention programmes (O'Dea & Abraham, 2000).

In the current study, both family functioning and self-esteem had an impact on psychosocial QoL and eating pathology in the control group, highlighting their importance as psychological factors, regardless of ED diagnosis. Furthermore, the impact of family dysfunction on self-esteem emphasizes the importance of family therapy in adult ED treatment. Even though family therapy is commonly used in the treatment of adolescent ED patients, research suggests that adults with EDs report more disordered family functioning than adolescents (Ciao et al., 2015). It should be noted that the majority of the current study's participants lived with at least one

family member (see Table 1), implying that family interactions and communication are a part of their daily life.

The current findings further highlight the importance of including a psychosocial QoL assessment tool as part of ED treatment, instead of focusing exclusively on reducing ED symptomatology. The impairment in multiple life domains may be minimized by addressing the underlying factors in therapy that appear to affect psychosocial QoL, such as family functioning and self-esteem, resulting in an improvement in ED pathology and better adjustment outside of clinical settings.

Theoretically, the findings suggest that existing ED theories should be revisited and adapted to create more comprehensive models that would adequately explain the role of family functioning and self-esteem in the development and maintenance of eating pathology, as well as the ways in which family dysfunction affects self-esteem.

**Limitations and Future Directions**

The known limitations of cross-sectional designs apply to this study in that causality cannot be implied because the nature of the data does not permit testing of the temporal relationships between constructs. However, Rindfleisch and colleagues (2007) argue that a thoroughly developed theoretical background strengthens causal inference and that, under certain conditions (strong correlations among constructs and a combination of strong theory and statistical tools), the results from cross-sectional studies can be comparably valid to those from longitudinal ones. These conditions were satisfied in this study. In line with Warner (2013), it is acknowledged that experimental data to estimate the strength of the paths would strengthen these results.

In addition, only White women were sampled, so the findings cannot be generalized to other racial/ethnic groups or men. However, a strength of the study is the inclusion of a non-student/non-athlete sample only as the control group, which is less typical in ED research but important because it is less biased. Additionally, having officially clinically assessed and diagnosed participants in the ED group increased reliability in terms of diagnosis, as the diagnostic procedure is more objective than self-reporting and does not rely on the use of one specific instrument at one point in time, which could lead to over - or misdiagnosis. Nevertheless, this study did not measure nor account for trauma, which could be important to capture because it could have an effect on trait self-esteem, especially if trauma has occurred at a young age. In addition, sociodemographic characteristics were not considered in the SEM models, although the effect of these variables on trait self-esteem is less likely. It is worth noting that while some scales had low reliability (which can reduce the likelihood of detecting significant effects), they all produced significant paths in the SEM model.

## Conclusion

The psychological mechanism that underpins the relationship between family functioning and EDs has not been sufficiently clarified (Erriu et al., 2020), and the current study found that trait self-esteem plays a greater role than family functioning in eating pathology. It is time to move on from investigations into family functioning alone to better understand the psychological mechanisms involved in the complex relationship with eating pathology development. In addition to addressing the aforementioned limitations, the current study should be extended in the following two ways. First, conceptualising family dysfunction more specifically (e.g., as abuse) is important for contextualising and understanding its effects on trait self-esteem. Second, exploring additional mediator variables as potential risk factors will clarify whether family dysfunction exerts its influence on EDs and QoL only through trait self-esteem or through other theoretically associated mechanisms as well.

## References


Adamson, J., Ozenc, C., Baillie, C., & Tchanturia, K. (2019). Self-Esteem Group: Useful Intervention for Inpatients with Anorexia Nervosa?. *Brain sciences*, *9*(1), 12. https://doi.org/10.3390/brainsci9010012

Allen, K. L., Gibson, L.Y., McLean, N. J., Davis, E. A., & Byrne, S. M. (2014). Maternal and family factors and child eating pathology: risk and protective relationships. *Journal of Eating Disorders 2*(1), 11. https://doi.org/10.1186/2050-2974-2-11

American Psychiatric Association. (2013). *Diagnostic and statistical manual of mental disorders* (5th ed.). Arlington, VA: American Psychiatric Publishing.

Anokhina, A. (2015). *Implicit attitudes towards food and the self in sub-clinical eating disorder pathology* (Unpublished doctoral dissertation). University College London, UK. Retrieved from http://discovery.ucl.ac.uk/1464573/1/Alisa%20Anokhina%20Thesis%20FINAL%20APRIL%202015.pdf

Arbuckle, J. L. (2013). AMOS 22 (Computer Software). Chicago: SPSS.

Arigo, D., Schumacher, L., & Martin, L. M. (2014). Upward appearance comparison and the development of eating pathology in college women. *International Journal of Eating Disorders, 47*(5), 467-470. doi: 10.1002/eat.22240

Balcetis, E., Cole, S., Chelberg, B.M., & Alicke, M. (2013). Searching out the ideal: awareness of ideal body standards predicts lower global self-esteem in women. *Self and Identity, 12*(1), 99-113. doi: 10.1080/15298868.2011.639549

Bentley, C., Gratwick-Sarll, K. & Mond, J. (2015). Perceived psychosocial impairment associated with eating disorder features: responses to a mental

health literacy intervention. *Journal of Eating Disorders, 3*,(46). https://doi.org/10.1186/s40337-015-0084-9

Biney, H., Hutt, M., Matthews, R., & Lacey, H. (2019). An evaluation of a manualised group self-esteem programme for Anorexia Nervosa patients regaining weight. *Archives Of Psychology, 3*(3). Retrieved from https://archivesofpsychology.org/index.php/aop/article/view/94

Bruch, H. (1982). Anorexia nervosa: Therapy and theory. *American Journal of Psychiatry, 139*(12), 1531-1538.

Cerniglia, L., Cimino, S., Tafà, M., Marzilli, E., Ballarotto, G. & Bracaglia, F. (2017). Family profiles in eating disorders: Family functioning and psychopathology. *Psychology Research and Behaviour Management, 10*, 305-312. doi: 10.2147/PRBM.S145463

Cervera, S., Lahortiga, F., Martínez-González, M. A., Gual, P., de Irala-Estévez, J., & Alonso, Y. (2003). Neuroticism and low-self-esteem as risk factors for incident eating disorders in a prospective cohort study. *The International Journal of Eating Disorders, 33*(3), 271-280.

Cheung, M. W. L. (2009). Comparison of methods for constructing confidence intervals of standardized indirect effects. *Behaviour Research Methods, 41*(2), 425–438. doi: 10.3758/BRM.41.2.425

Ciao, A. C., Accurso, E. C., Fitzsimmons-Craft, E. E., Lock, J., & Le Grange, D. (2015). Family functioning in two treatments for adolescent anorexia nervosa. *International Journal of Eating Disorders, 48*(1), 81-90. doi: 10.1002/eat.22314

Colmsee, I.-S. O., Hank, P., & Bošnjak, M. (2021). Low self-esteem as a risk factor for eating disorders: A meta-analysis. *Zeitschrift Für Psychologie, 229*(1), 48–69. https://doi.org/10.1027/2151-2604/a000433

de la Rie, S. M., Noordenbos, G., & Van Furth, E. F. (2005). Quality of life and eating disorders. *Quality of Life Research, 14*(6), 1511-1522. doi: 10.1007/s11136-005-0585-0

Eisler, I. (2005). The empirical and theoretical base of family therapy and multiple family day therapy for adolescent anorexia nervosa. *Journal of Family Therapy, 27*(2) 104–131.

Epstein, B. N., Baldwin, M. L., & Bishop, S. D. (1983). The McMaster family assessment device. *Journal of Marital and Family Therapy, 9*(2), 171-180.

Epstein, B. N., Bishop, S. D., & Levin, S. (1978). The McMaster model of family functioning. *Journal of Marital and Family Therapy, 4*(4), 19-31. doi: 10.1111/j.1752-0606.1978.tb00537.x

Erriu, M., Cimino, S., & Cerniglia, L. (2020). The role of family relationships in eating disorders in adolescents: A narrative review. *Behavioural sciences (Basel, Switzerland), 10*(4), 71. https://doi.org/10.3390/bs10040071

Fairburn, C. G., & Beglin, S. J. (2008). Eating Disorder Examination Questionnaire (EDE-Q 6.0). In C. G. Fairburn (Ed.), *Cognitive behaviour therapy and eating disorders* (pp. 309–314). New York: Guilford Press.

Fritz, M. S., & MacKinnon, D. P. (2007). Required sample size to detect the mediated effect. *Psychological Science, 18*(3), 233-239. doi: 10.1111/j.1467-9280.2007.01882.x

Harter, S. (2012). *The construction of the self: Developmental and sociocultural foundations*. New York, NY: Guilford.

Holtom-Viesel, A., & Allan, S. (2014). A systematic review of the literature on family functioning across all eating disorder diagnosis in comparison to control families. *Clinical Psychology Review, 34*(1). doi: 10.1016/j.cpr.2013.10.005

Hooper, D., Coughlan, J. & Mullen, M. R. (2008). *Evaluating model fit: A synthesis of the structural equation modelling literature.* Paper presented at the 7th European Conference on Research Methodology for Business and Management Studies, Regent's College, London, United Kingdom.

Hu, L. T., & Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural Equation Modeling, 6*(1), 1-55. doi: 10.1080/10705519909540118

IBM Corporation. (2012). IBM *SPSS Statistics for Windows, Version 21.0*. Armonk, NY: IBM Corporation.

Jackson, D. L., Gillaspy Jr, J. A., & Purc-Stephenson, R. (2009). Reporting practices in confirmatory factor analysis: An overview and some recommendations. *Psychological Methods, 14*(1), 6-23.

Jenkins, P. E., Hoste, R. R., Meyer, C., & Blissett, J. M. (2011). Eating disorders and quality of life: A review of the literature. *Clinical Psychology Review, 31*(1), 113-121. https://doi.org/10.1016/j.cpr.2010.08.003

Karwautz, A., Nobis, G., Haidvogl, M., Wagner, G., Hafferl-Gattermayer, A., Cicek Wöber-Bingöl, & Friedrich, M. H. (2003). Perceptions of family relationships in adolescents with anorexia nervosa and their unaffected sisters. *European Child &*

*Adolescent Psychiatry, 12*(3), 128-135. doi:http://dx.doi.org/10.1007/s00787-003-0319-1

Knobloch-Westerwick, S., & Crane, J. (2012). A losing battle: effects of prolonged exposure to thin ideal images on dieting and body satisfaction. *Communication Research, 39*(1), 79-102.

Kroplewski, Z., Szcześniak, M., Furmańska, J., & Gójska, A. (2019). Assessment of Family Functioning and Eating Disorders - The Mediating Role of Self-Esteem. *Frontiers in psychology*, *10*, 921. https://doi.org/10.3389/fpsyg.2019.00921

Le Grange, D., Lock, J., Loeb, K., & Nicholls, D. (2010). Academy for Eating Disorders position paper: The role of the family in eating disorders. *International Journal of Eating Disorders, 43*(1), 1-5. doi: 10.1002/eat.20751

Leung, F., Schwartzman, A., & Steiger, H. (1996). Testing a dual-process family model in understanding the development of eating pathology: a structural equation modelling analysis. *International Journal of Eating Disorders, 20*(4), 367-375. doi: 10.1002/(SICI)1098-108X(199612)20:4<367::AID-EAT4>3.0.CO;2-L

Maassen, G. H., & Bakker, A. B. (2001). Suppressor variables in path models.

definitions and interpretations. *Sociological methods & Research, 30*(2), 241-270.

Minuchin, S., Baker, L., Rosman, B. L., Liebman, R., Milman, L., & Todd, T. C. (1975). A conceptual model of psychosomatic illness in children. Family organisation and family therapy. *Archives of General Psychiatry*, *32*(8), 1031-1038. doi: 10.1001/archpsyc.1975.01760260095008

MacKinnon, D. P., Lockwood, C. M., & Williams, J. (2004). Confidence limits for the indirect effect: Distribution of the product and resampling methods. *Multivariate Behaviour Research, 39*(1), 99–128. doi: 10.1207/s15327906mbr3901_4

Newns, K., Bell, L., & Thomas, S. (2003). The impact of self-esteem group for people with eating disorders: An uncontrolled study. *Clinical Psychology and Psychotherapy, 10*(1), 64-68. doi: 10.1002/cpp.352

Orth, U., Erol, R. Y., & Luciano, E. C. (2018). Development of self-esteem from age 4 to 94 years: A meta-analysis of longitudinal studies. *Psychological Bulletin, 144*(10), 1045-1080. http://dx.doi.org/10.1037/bul0000161

O'Dea, J., & Abraham, S. (2000). Improving the body image, eating attitudes and behaviours of young male and female adolescents: a new educational approach that focuses on self-esteem. *International Journal of Eating Disorders, 28*(1), 43-57. doi: 10.1002/(SICI)1098-108X(200007)28:1<43::AID-EAT6>3.0.CO;2-D

Padierna, A., Quintana, J. M., Arostegui, I., Gonzalez, N., & Horcajo, M. J. (2002). Changes in health related quality of life among patients treated for eating disorders. *Quality of Life Research, 11*(6), 542-552. doi: 10.1023/A:1016324527729

Pohjolainen, V., Koponen, S., Räsänen, P., Roine, R., Sintonen, H., Karlsson, H., … Roine, R. P. (2016). Long-term health-related quality of life in eating disorders. *Quality of Life Research, 25*(9), 2341–2346. https://doi.org/10.1007/s11136-016-1250-5

Ragnhildstveit, A., Slayton, M., Jackson, L. K., Brendle, M., Ahuja, S., Holle, W., Moore, C., Sollars, K., Seli, P., & Robison, R. (2022). Ketamine as a Novel Psychopharmacotherapy for Eating Disorders: Evidence and Future Directions. *Brain Sciences (2076-3425)*, *12*(3), 382. https://doi.org/10.3390/brainsci12030382

Rezaei-Dehaghani, A., Paki, S., & Keshvari, M. (2015). The relationship between family functioning and self-esteem in female high school students of Isfahan, Iran, in 2013-2014. *Iranian journal of nursing and midwifery research*, *20*(3), 371–377.

Rindfleisch, A., Malter, A. J., Ganesan, S., & Moorman, C. (2008). Cross-Sectional versus Longitudinal Survey Research: Concepts, Findings, and Guidelines. Journal of Marketing Research, 45(3), 261–279. https://doi.org/10.1509/jmkr.45.3.261

Rosenberg, M. (1965) *Society and the adolescent self-image.* Princeton, NJ: Princeton University Press.

Schreiber, J. B. (2008). Core reporting practices in structural equation modeling. *Research in Social and Administrative Pharmacy*, *4*(2), 83–97. doi: 10.1016/j.sapharm.2007.04.003

Silverstone, P. H. (1992). Is chronic low self-esteem the cause of eating disorders? *Medical Hypothesis, 39,* 311-315. doi: http://dx.doi.org/10.1016/0306-9877(92)90054-G

Stice, E., Becker, C. B., & Yokum, S. (2013). Eating disorder prevention: Current evidence-based and future directions. *International Journal of Eating Disorders, 46*(5), 478-485. doi: 10.1002/eat.22105

Tabachnick, G. B., & Fidell, S. L. (2007). *Using multivariate statistics*. (5th ed.). Boston: Pearson Eduction, Inc.

Tofighi, D., & MacKinnon, D. P. (2011). RMediation: An R package for mediation analysis confidence intervals. *Behaviour Research Methods, 43*(3), 692-700. doi:10.3758/s13428-011-0076-x.

Ura, M., & Preston, K. S. J. (2015). The influence of thin-ideal internalisation on women's body image, self-esteem and appearance avoidance: Covariance structure analysis. *American Communication Journal, 17*(2), 15-26.

Warner, R. M. (2013). *Applied statistics: From bivariate through multivariate techniques*. (2nd ed.). Sage Publications, Inc.: California, USA.

Wisotsky, W., Dancyger, I., Fornari, V., Katz, J., Wisotsky, W.L., & Swencionis, C. (2003). The relationship between eating pathology and perceived family functioning in eating disorder patients in a day treatment program. *Eating Disorders, 11*(2), 89-99. doi: 10.1080/10640260390199280

Woodward, K., McIlwain, D., & Mond, J. (2019). Feelings about the self and body in eating disturbances: The role of internalised shame, self-esteem, externalized self-perceptions, and body shame. *Self & Identity*, *18*(2), 159–182. https://doi.org/10.1080/15298868.2017.1403373

World Health Organisation. (1996). *WHOQOL-BREF: Introduction, administration, scoring and generic version of the assessment. Field trial version.* Geneva: WHO.