



**Understanding and Addressing the Link Between Social Anxiety and Eating
Psychopathology**

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Declaration

I confirm that this project is an original research project conducted by the author under supervision. I confirm that the project was completed for the sole purpose of fulfilment of the research component of the doctorate in clinical psychology. This report has not been submitted, in part or whole, for any other degree classification or at any other institution.

Word counts

Section One: Literature review

Literature review (without references and tables): 4730

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Section Two: Empirical Report

Empirical report (without references and tables): 5168

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Lay Summary

Social anxiety and eating psychopathology frequently co-occur. Fear of negative evaluation, specifically social appearance anxiety, underlies both social anxiety and eating psychopathology. This thesis aimed to investigate the relationship between social anxiety and eating psychopathology and to evaluate the acceptability, feasibility and preliminary effectiveness of a survey intervention for social appearance anxiety in people at risk of eating psychopathology.

The thesis is divided into two sections. The first half is a systematic review and meta-analysis of the literature, which investigated the extent to which eating psychopathology and social anxiety are related. Seventy-five papers were identified through a systematic search of Psycinfo, Scopus and Medline. The findings reinforce the notion that there is a significant relationship between social anxiety and eating psychopathology.

The second section is an empirical research project using a wait-list control design, which aimed to investigate the feasibility, acceptability and preliminary effectiveness of a body image survey intervention in females at risk of eating psychopathology. The results suggested that body image surveys are deemed acceptable by patients and are strongly effective at reducing social appearance anxiety. The wait-list control design was a feasible way of evaluating body image surveys. Whilst a full trial is now needed, body image surveys should be used in clinical practice to target social appearance anxiety.

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**The comorbidity of social anxiety and eating psychopathology:
A systematic review and meta-analysis**

Abstract

Objectives: Social anxiety and eating psychopathology frequently co-occur. The present study aimed to summarise existing quantitative evidence linking social anxiety and eating psychopathology.

Method: Electronic databases were systematically searched for studies that included information from validated measures that allowed for computing the relationship between social anxiety and eating psychopathology. This included studies that compared social anxiety in eating disordered groups to controls and eating psychopathology in social anxious groups to controls. Seventy-five studies were identified, 25 were included in an independent groups meta-analysis and 50 in a correlation meta-analysis.

Results: Results suggest a moderate association between social anxiety and eating psychopathology. The Fear of Negative Evaluation scale produced significantly larger associations than other social anxiety measures. Additionally, social anxiety was significantly higher in eating disorder groups when comparing to control or other comparison groups, with a large effect. The Liebowitz Social Anxiety Scale measure produced significantly higher group differences than other social anxiety measures. Diagnostic group also impacted this relationship, with Anorexia Nervosa producing higher effect sizes than controls, in comparison with Bulimia Nervosa and other eating disorders. Eating psychopathology was also significantly higher in social anxiety groups in comparison to control groups, with a small to medium effect size.

Conclusions: These findings reinforce the notion that there is a strong relationship between social anxiety and eating psychopathology. Clinically, the findings

underscore the need for interventions targeting shared features of social anxiety and eating psychopathology, such as fear of negative evaluation.

Practitioner Points

- It is important to assess social anxiety in eating-disordered populations and eating psychopathology in socially anxious populations.
- To ensure the relationship between social anxiety and eating psychopathology is not over-estimated, measures that capture cognitive, behavioural and somatic aspects of social anxiety should be used.
- It is important to consider interventions that target both social anxiety and eating psychopathology. It is likely to be helpful to focus interventions on the transdiagnostic factor of fear of negative evaluation.

The comorbidity of social anxiety and eating psychopathology: A systematic review and meta-analysis

Introduction

Eating disorders manifest in various forms, all marked by unhealthy eating patterns driven by psychological factors (American Psychiatric Association, 2022). They are severe mental health conditions associated with significant physical and psychological impairment (Crow et al., 2009; Jenkins et al., 2011; Pohjolainen et al., 2016). The lifetime prevalence of eating disorders in Western countries is around 1.89%, and as high as 2.58% in females (Qian et al., 2021). Sub-clinical eating psychopathology frequently manifests in the general population (Jacob et al., 2018). It has been found that around 40% of people present with over-evaluation of shape and weight, a central element of eating psychopathology (da Luz et al., 2018). Body dissatisfaction, binge eating and strict dieting are also common in the general population (Fallon et al., 2014; Fiske et al., 2014, Tatangelo et al., 2016; da Luz et al., 2018; Kidwell et al., 2014), and it seems that there are similar relationships between these symptoms in the general population to those that manifest in clinical eating disorders (da Luz et al., 2018).

Eating disorders are associated with high levels of psychiatric comorbidity (Hambleton et al., 2022; Momen et al., 2022). One of the most prevalent comorbidities is Social Anxiety Disorder (Swinbourne et al., 2012; Swinbourne & Touyz, 2007), with estimates ranging from 42% - 59% of people with an eating disorder having Social Anxiety Disorder (Godart et al., 2000; Swinbourne et al., 2012). Additionally, social anxiety measures seem to correlate moderately with eating psychopathology in the general population (Menatti et al., 2015).

Social anxiety

Social anxiety disorder is defined as a marked, or intense, fear or anxiety of social situations in which the individual may be scrutinized by others (American Psychiatric Association, 2022). People with social anxiety can place extreme importance on appearance as a means of gaining social acceptance or avoiding negative judgment, which can lead to disordered eating behaviours as a coping strategy (Godart et al., 2000). Therefore, social anxiety has been hypothesised as a risk factor for eating psychopathology (Pallister & Waller, 2008), as it frequently seems to precede the eating disorder onset (Godart et al., 2000; Kerr-Gaffney et al., 2018; Swinbourne et al., 2012). Social anxiety can then be further exacerbated by the eating disorder pathology (Swinbourne et al., 2012). Whilst there is much research around social anxiety in eating disorder populations, there is a lack of research around eating psychopathology in people with social anxiety disorder (Swinbourne & Touyz, 2007). However, Becker (2004) indicates that the prevalence of eating disorders amongst social phobia populations is high.

The co-occurrence of social anxiety and eating psychopathology is associated with poorer treatment outcomes for eating psychopathology and more severe eating psychopathology (Espel-Huynh et al., 2018; Kerr-Gaffney et al., 2018; Smith et al., 2018). Social anxiety has been associated with poorer levels of help-seeking (Goodwin & Fitzgibbon, 2002; Ranta et al., 2017), which may explain the poorer prognosis. Therefore, it is important to understand the link between social anxiety and eating psychopathology.

Theoretical links

Multiple explanations have been suggested for why social anxiety and eating psychopathology commonly co-occur. Primarily, social-evaluative concerns are a central shared feature in both social anxiety and eating psychopathology (Levinson &

Rodebaugh, 2012; Wonderlich-Tierney et al., 2010). One key construct is the fear of negative evaluation, which is defined as the fear of being judged unfavourably by others and expecting criticism or rejection (Watson & Friend, 1969). Fear of negative evaluation has been suggested to be a vulnerability factor for both social anxiety (Rapee & Heimberg, 1997) and eating psychopathology (Levinson & Rodebaugh, 2012; Utschig et al., 2010). Therefore, fear of negative evaluation might be a shared cognitive risk factor underlying both conditions. Alternatively, fear of negative evaluation has been suggested as an important mediator between social anxiety and eating psychopathology (Menatti et al., 2015), with fear of negative evaluation driving the progression from social anxiety to eating psychopathology. Additionally, social appearance anxiety, which is when people fear others are negatively evaluating their appearance (Hart et al., 2008), is strongly associated with eating psychopathology (Alcaraz-Ibanez et al., 2023), highlighting the role of social evaluative concerns in both conditions.

Fear of negative evaluation is also associated with perfectionism (Radhika & Vignarath Bapu, 2023; Shafique et al., 2017). Perfectionism has been proposed as a linking factor between social anxiety and eating psychopathology (Silgado et al., 2010), as perfectionism is associated with social anxiety (Ferber et al., 2024) and eating psychopathology (Bardon-Cone et al., 2007). Whilst perfectionism has been considered a shared vulnerability factor for both conditions (Levinson & Rodebaugh, 2016), other research suggests perfectionism mediates the relationship between social anxiety and eating psychopathology (Menatti et al., 2013).

Additionally, experiential avoidance and expressive suppression have been found to be significant mediators between social anxiety and eating psychopathology (Espel et al., 2019; Fulton et al., 2012; McLean et al., 2007). According to the displacement hypothesis, people who experience high levels of social anxiety

suppress the expression of negative emotions and shift them onto the body, thereby increasing body dissatisfaction and other symptoms of disordered eating (McLean et al., 2007). Suppression of negative emotions may lead to avoidance of situations that elicit high emotion through an intense focus on food and weight, thus reinforcing and maintaining eating psychopathology (Espel et al., 2019; Kerr-Gaffney et al., 2018; McLean et al., 2007).

Finally, shame is significantly associated with both eating psychopathology (Nechita et al., 2021; Grabhorn et al., 2006) and social anxiety (Fergus et al., 2010; Swee et al., 2021), suggesting a possible shared vulnerability factor. Longitudinal findings further support this connection, with shame prospectively predicting both social anxiety and bulimic symptoms (Levinson et al., 2016). More specifically, body shame has been identified as a significant mediator of the relationship between social anxiety and binge eating (Mason & Lewis, 2016). In clinical populations with eating disorders, elevated levels of social anxiety have been linked to heightened levels of the defectiveness schema, which reflects persistent feelings of shame and unworthiness (Hinrichsen et al., 2007). Shame, therefore, might also play a key role in understanding the interplay between social anxiety and eating psychopathology (Grabhorn et al., 2006).

This Study

Given the high levels of co-occurrence, understanding the relationship between social anxiety and eating psychopathology is important. Kerr-Gaffney et al (2018) completed a systematic review and meta-analysis on the comorbidity of social anxiety and eating psychopathology. However, that review was limited by focusing exclusively on clinical presentations of eating disorders (i.e., diagnosed cases). Given that social anxiety is viewed as a vulnerability factor for eating psychopathology (Pallister & Waller, 2008), it seems important to look at this

relationship more broadly, which this study aims to do. Kerr-Gaffney et al.'s (2018) meta-analysis was small (12 studies) and focused exclusively on group differences. Therefore, this study aims to supplement their conclusions by completing a correlational meta-analysis to explore the association between social anxiety and eating psychopathology, as well as an independent groups meta-analysis.

To summarise, the primary question of this meta-analysis is: To what extent are social anxiety and eating psychopathology related to each other, in both categorical and dimensional ways. The study will also aim to explore through moderator and sub-group analyses whether such relationships vary with eating disorder type, characteristics of the paper, gender, age, and types of measures used.

Method

The study used a systematic review and random effects meta-analysis approach in order to deliver a narrative synthesis supported by quantitative understanding based on overall effect sizes. The meta-analysis considered potential sources of variance, using moderator and sub-group analysis, in order to inform research and clinical conclusions. This review and meta-analysis were pre-registered on Prospero (CRD42024573575), in order to ensure transparency of the process.

Eligibility criteria

Inclusion criteria were:

- Studies containing one or more validated self-reported or interview instruments measuring social anxiety. The measure could provide either continuous scores or categorical classifications of social anxiety.
- Studies containing one or more validated self-reported or interview instruments measuring eating psychopathology. The measure could provide either continuous scores or categorical classifications of eating disorders.

- A control group/comparison group was required in studies that compared across groups.
- Participants of any age with some eating psychopathology present.
- Published in a peer-reviewed journal.
- Full article available in English.
- Enough information to calculate an effect size.

Exclusion criteria:

- Single case studies.
- Studies with fewer than 10 participants.
- Studies measuring only related constructs (e.g. 'social appearance anxiety' where social anxiety is centred around appearance).
- The measure of eating psychopathology or social anxiety is not validated in a peer-reviewed paper.
- Populations studied are people with learning disability, as many psychometric measures are not validated with people with learning disability.
- Populations studied are people with psychosis due to the complex interplay between psychosis and social anxiety (Wong, 2020).

There were some minor changes to the eligibility criteria following pre-registration.

The pre-registration stated a high average score of eating psychopathology was required; however, this was changed to ensure inclusivity of studies and to improve the feasibility of completing the review. Additionally, control groups were required for studies comparing across groups to ensure that this review captured the relationship between social anxiety and eating psychopathology.

Literature Search and Search Strategy

The electronic databases MEDLINE, Scopus and PsycINFO were searched

by the lead researcher on 28th February 2025. Search terms (Appendix 1) were “social phobia*” OR “social anxiety” AND “anorexi*” OR “bulimi*” OR “binge eat*” OR “avoidant restrictive food intake disorder” OR “ARFID” OR “otherwise specified feeding and eating disorder” OR “OSFED” OR “eating disorder not otherwise specified” OR “EDNOS” OR “eating psychopathology” OR “eating attitude*”. No search limits were applied.

Study selection

Screening and selection of articles is displayed in Figure 1. Titles and abstracts were screened to check eligibility according to inclusion and exclusion criteria. Full texts of potentially eligible studies were then retrieved and screened for eligibility. Ten percent of title and abstract screening (94.4% agreement) and full-text screening (97.67% agreement) were also assessed by another trainee clinical psychologist to ensure inter-rater reliability. Any discrepancies were discussed until a consensus was reached.

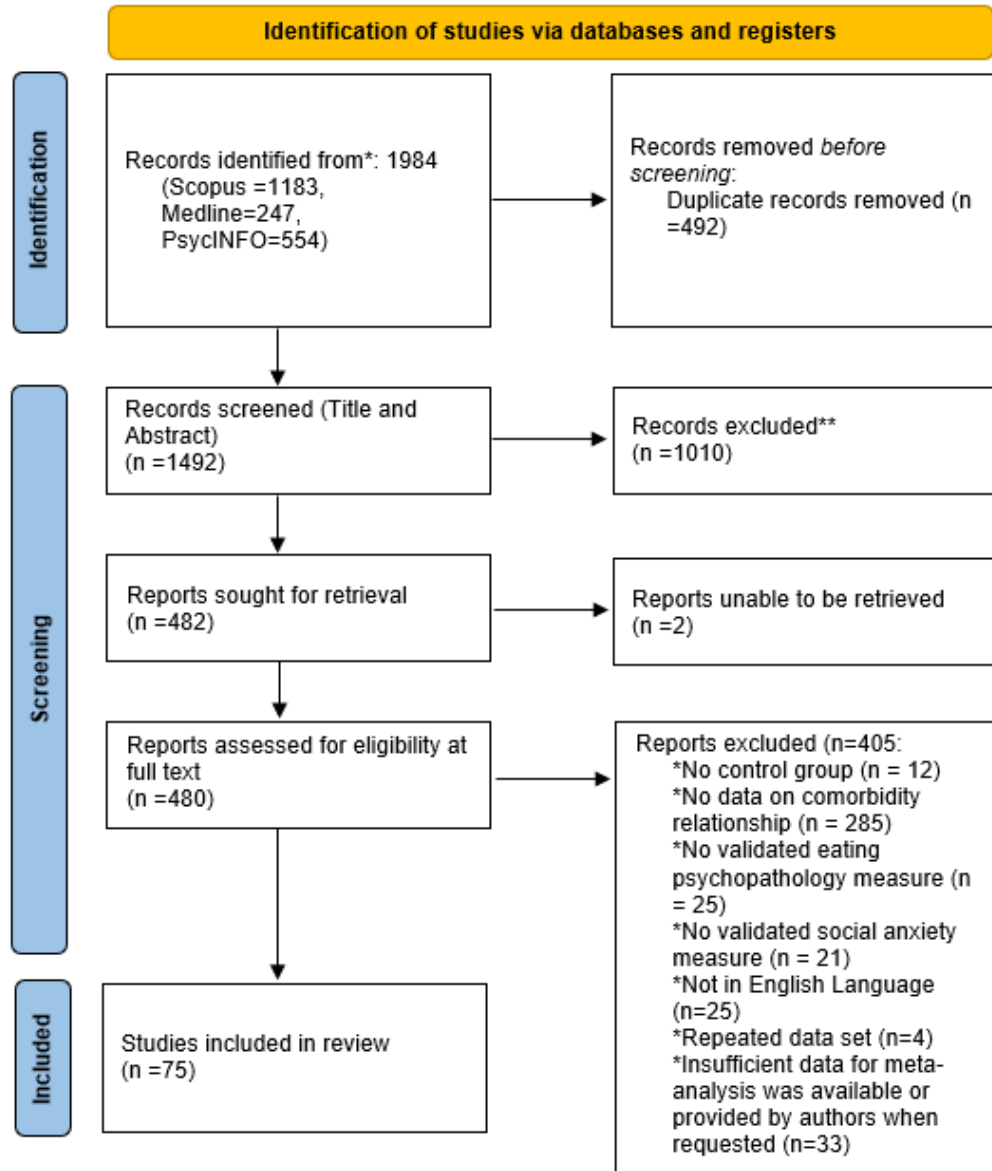


Figure 1 – PRISMA diagram

When a study did not report the data needed for the meta-analysis, study authors were contacted (n=21). If no response was received (n=15), studies were excluded. Twenty-five studies were identified and included in the independent groups meta-analysis (Table 1), and 50 studies were identified and included in the correlation meta-analysis (Table 2).

Data collection

The following information was extracted from each paper: number of participants, recruitment source, age, BMI, percentage of female participants,

measures used for eating psychopathology, means and standard deviations for the primary outcome eating psychopathology measure, measures used for social anxiety and means and standard deviations for the primary outcome social anxiety measure. The effect size reported was also extracted. Where the study used multiple measures for eating psychopathology and social anxiety, data from the most relevant outcome measure was extracted, as indicated in Tables 3 and 4. Measures that looked at social anxiety and eating psychopathology most broadly were deemed most relevant. For example, the Social Phobia Inventory was deemed more relevant than Social Interaction Anxiety Scale.

Quality Assessments

The quality of individual studies was assessed using the CASP checklists (cross-sectional and case-control) by the main author (Appendix 2). Journal articles were evaluated based on how the paper was used in this review. To ensure inter-rater reliability, another trainee clinical psychologist completed 10% of the CASP checklists (93.18% agreement). Any discrepancies were then discussed until a consensus was reached. A score of 1 was given for each “yes” answer on the CASP checklists, and a score of 0 was given for “no” or “can’t tell”. Means were then calculated by summing the number of “yes” responses and dividing by the number of items on the CASP tool to create a CASP score.

To assess the certainty in the synthesised meta-analytic evidence representing the true effect, the Grading of Recommendations Assessment, Development and Evaluation (GRADE) system was used (Granholt et al., 2019). This approach is separate to the study quality appraisal as it considers the entire body of evidence rather than critical appraisal of the individual studies. Following the GRADE guidelines (Brennan & Johnston, 2023), initial evidence quality level was set at ‘high’, due to the cross-sectional and case-control design of the included studies.

To determine the final quality of evidence rating, the meta-analyses were assessed according to five criteria: risk of bias in included studies; degree of imprecision in synthesised estimates; degree of inconsistency represented by unexplained heterogeneity; indirectness of evidence; and extent of publication bias. Quality level was down- or upgraded based on the evidence for each criterion.

Table 1- Study information for group meta-analysis

No	Study	Sample	Outcome measure	Mean (SD) outcome measure	Mean age (SD)	Mean BMI (SD)	% female	CASP score	Effect size from paper	Hedges G
1	Brede et al. (2024)	69 participants with autism	SPIN	37.23 (13.45)	39.59 (11.61)	26.91 (6.61)	92.8%	0.5	Autism vs Restrictive ED $d = 0.05$	0.05
		57 participants with autism and restrictive eating disorder		45.60 (12.34)	31.46 (11.24)	18.12 (3.17)	87.7%		Autism with restrictive ED vs autism $d = 0.64$	0.64
		80 participants with restrictive eating disorders		36.53 (13.45)	29.83 (8.53)	17.26 (2.79)	100			
2	Piko et al. (2022)	11 adolescents“ at risk” of eating psychopathology (EAT-26 score above 20)	Kutcher Generalized Social Anxiety Scale for Adolescents - social anxiety subscale	27.90 (16.24)	16.01 (1.08) overall	24.3 (3.61)	46.3% overall	0.42	Odds ratio 1.05	0.62
		101 adolescents without eating psychopathology risk (EAT-26 score below 20)		18.70 (12.81)		21.8 (2.58)				
3	Olgiati et al. (2022)	95 adults with Major depression disorder and binge eating (Score of 7+ on ED subscale of psychiatric diagnostic screening	Psychiatric Diagnostic Screening Questionnaire – social phobia subscale	7.68 (4.96)	41.91 (12.46)	NR	67%	0.92	Cohens $d = 0.57$	0.57

		questionnaire (PDSQ))								
		387 patients with Major Depression disorder without binge eating (score less than 7 on ED subscale of PDSQ)		4.84 (4.92)	43.45 (12.45)		71%			
4	Mancuso et al. (2022)	32 undergraduates with high trait FNE	Three factor Eating Questionnaire - Cognitive restraint subscale	15.5 (4.9)	21.2 (4.5)	25.5 (2.3)	100%	0.5	<i>d</i> -0.256	0.29
		29 undergraduates with low trait FNE		14 (5.2)	22.6 (7.8)	25.4 (5.7)				
5	Li et al. (2022)	144 students (EAT over 20)	The social anxiety scale – adolescents – FNE subscale	16.67 (8.874)	12.97 (1.119)	21.25 (4.558)	41%	0.5	<i>d</i> - 0.256	0.26
		1466 students control group		14.60 (7.207)	13.13 (0.936)	19.655 (3.969)	48%			
6	Kerr-Gaffney et al (2021)	46 patients with AN (SCID-5-RV confirmed)	LSAS	69.18 (28.53)	20.66 (8.59)	15.81 (1.37)	90.2%	0.75	<i>d</i> AN vs HC 1.77	1.75
		51 patients with recovered AN (SCID-5-RV confirmed)		57.17 (30.29)	26.1 (8.15)	21.18 (1.91)	97.9%			
		40 healthy controls		27.00 (17.8)	23.90 (4.750)	21.75 (1.96)	95%			
7	Hagan & Forbush (2021)	15 participants with Bulimia Nervosa	Inventory of Depression and Anxiety	17.2 (7)	19.8 (2.62)	26.75 (7.25)	100%	0.75	<i>d</i> = 0.52	1.48

		18 healthy controls	Symptoms - Social anxiety subscale	8.72 (3.69)	20.11 (2.76)	23.48 (4.5)				
8	Boscoe et al.(2021)	164 ED group (EAT-26 score 20+)	SPIN	35.59 (15.49)	23.15 (17.20)	23.15 (7.2)	81.5% overall	0.75	$d = 0.21$	0.21
		380 non-ED group (EAT-26 below 20).		25.34 (13.96)	Overall	overall				
9	Garcia et al. (2020)	563 female twins (46 with SAD)	Minnesota Eating behaviour survey	8.64 (6.6) with diagnosis of SAD	17.6 (1.8)	23.58 (5.39)	100%	0.67	$d = 0.7$	0.70
				5.11 (4.75) without diagnosis of SAD						
10	Schmelkin et al. (2017)	19 participants with AN	LSAS – social fear	Social fear 15.8 (1.6) (public fear 17.4 (2.0), Social avoidance 14.5 (1.8), public avoidance 14.3 (2.0))	25.1 (1.7)	17.7 (0.2)	100%	0.59	Hedges g AN vs healthy – 1.70	1.70
		26 participants recovered AN		Social fear 9.7 (1.1) , (public fear 11.2 (1.0), Social avoidance 8.5 (1.2), public avoidance 8.0 (1.1))	22.9 (0.5)	22.5 (0.4)			Hedges g recovered AN vs healthy– 0.8	
		34 healthy participants		Social fear 5.4 (1.0) , (public fear (6.8 (1.0)), Social avoidance 5.0(0.7), public avoidance 5.0	23.9 (0.8)	22.6 (0.3)			Hedges g recovered AN vs AN 0.96	

				(0.9))						
11	Steinglass et al. (2017)	27 with AN (SCID confirmed)	LSAS/ EDEQ	LSAS 52.44 (23.07) EDEQ 3.57 (1.52)	27.7 (7.5)	17.5 (1)	100%	0.67	<i>d</i> (LSAS AN vs HC) – 2.387 <i>d</i> (EDEQ SAD vs HC) 0.545	2.37 0.54
12		75 healthy control		LSAS 11.39 (7.69) EDEQ 0.49 (0.63)	29 (7.6)	24.1 (4.4)	52%			
		44 with SAD (SCID confirmed)		LSAS 74.72 (20.05) EDEQ 0.92 (0.92) (A	30 (4)	23.9 (6.3)	57%			
13	Steinman et al. (2016)	62 healthy control	LSAS/ EDEQ	LSAS 12.82 (8.01) EDEQ 0.54 (0.63)	27.6 (6.5)	NR	53%	0.58	<i>d</i> (LSAS AN vs HC) – 2.309 <i>d</i> (EDEQ SAD vs HC) 0.444	2.29 0.44
14		26 patients with AN (SCID confirmed)		LSAS 27.81 (20.15) EDEQ 3.52 (1.6)	26.93 (7.67)		100%			
		37 patients with SAD (SCID confirmed)		LSAS 75 (19.32) EDEQ 0.89 (0.92)	28.54 (6.66)		29%			
15	Kartal Yağiz et al. (2016)	87 SAD undergraduates	EAT - 40	14.73 (8.79)	20.59 (1.85)	NR	64.37%	0.42	<i>d</i> = 0.084	0.08
		87 Healthy undergraduates		14.03 (7.9)			59.8%			
16	Schneier et al. (2016)	30 patients with AN	LSAS/ EDEQ	LSAS 54.1 (26.1) EDEQ 3.6 (1.5)	26.9 (7.5)	NR	97%	0.75	<i>d</i> (LSAS AN vs HC) – 2.206 <i>d</i> (EDEQ SAD vs HC) 0.523	2.19 0.52
17		43 patients with SAD		LSAS 76.4 (19.8) EDEQ 0.9 (0.9)	26.9 (7.5)		53%			
		74 Healthy		LSAS 11.5 (8.0)	28.9 (76.)		51%			

		Controls		EDEQ 0.5 (0.6)						
18	Silgado et al. (2010)	89 undergraduates with clinical significant social anxiety	EDI Drive for Thinness subscale	EDI Drive for Thinness 22.61 (9.28) (Body dissatisfaction 32.42 (10.8)) Bulimia (16.73 (6.56)), perfectionism (23.48 (6.56)),	18.88 (1.13)	NR	69.7%	0.75	d- DT (0.457) Bulimia $d=0.626$ Body dissatisfaction $d=0.449$	0.46
		89 matched control group	EDI Drive for Thinness subscale	EDI Drive for Thinness 18.56 (8.43) (Body dissatisfaction 27.76 (9.92)), Bulimia (13.12 (4.84)), perfectionism (21.51 (6.21))	18.96 (1.56)		68.5%			
19	Mangweth-Matzek et al. (2010)	32 men with eating disorders (SCID confirmed)	SCID – social phobia diagnosis	34%	26.5 (6.4)	20.2 (3.4)	0%	0.75	Odds ratio (between groups) 10.7	1.29
		43 men without history of ED		5%	24.7 (4.1)	22.8 (1.8)				
20	Grabhorn et al. (2006)	30 patients with AN applying for inpatient care	Social Phobia Scale	29.3 (11.3)	25.5 (7.7)	NR	100%	0.67	d AN vs depression = 0.657 d AN vs anxiety 0.65	0.65
		30 patients with BN applying for inpatient care		35.4 (16.2)	24.9 (6.8)					
21		30 Depression		19.5 (18.1)	36.9					

		applying for inpatient care			(12.8)				d BN vs depression 0.96	0.95
		30 anxiety applying for inpatient care		21.3 (13.0)	41.1 (10.9)				<i>d BN vs anxiety 0.926</i>	
22	Gilboa-Schechtman et al. (2006)	20 patients with AN	LSAS	73.05 (37.28)	16.6 (2.48)	NR	100%	0.67	d AN vs control = 1.33	1.30
23		20 patients with BN		58.6 (42.48)	19.65 (5.01)				d BN vs control 0.753	0.74
		20 control women		33.9 (18.67)	19.65 (5.01)					
24	Jordan et al. (2003)	40 women with spectrum AN (SCID confirmed)	SCID-P	32 % social phobia	23.15 (6.69)	NR	100%	0.58	Odds ratio 1.85	0.34
		58 women with depression (SCID confirmed)		21% social phobia	26.48 (6.5)					
25	Hinrichsen et al., (2003)	21 patients in specialist ED clinic with AN restrictive subtype	FNE	23.5 (8.68)	25.7 (9.06)	NR	100%	0.67	d (restrictive AN vs control) = 0.635	0.63
26		34 patients with AN bulimic subtype		26.7 (4.32)	28.0 (6.79)				d (AN bulimic subtype vs control) 1.414	1.40
27		59 patients with bulimia		23.6 (6.72)	26.9 (6.56)				d (BN vs control) 0.745	0.74
		50 control group (undergraduates)		18.5 (6.97)	19.8 (0.86)					
28	Lilenfeld et al., (1998)	20 women with BN and lifetime	SADS-L social phobia	30%	25 (5)	NR	100%	0.67	Odds ratio BN without	-0.12

		history of alcohol and drug dependence from ED programs and local adverts (SADS-L confirmed)	diagnosis						substance misuse vs control 0.808	
29		20 women with BN and no lifetime history of alcohol and drug dependence from ED programs and local adverts (SAD-L confirmed)		4%	25 (7)				Odds ratio BN with substance misuse vs control 9	1.20
		44 control women from commercial mailing list		5%	26 (6)					
30	Bulik et al., (1997)	68 AN group from specialist ED services (diagnostic interview for genetic studies confirmed)	diagnostic interview for genetic studies - diagnosis of social phobia (for AN and control groups)	5.9%	31.3 (4.9)	NR	100%	0.67	Odds ratio AN vs control = 1	0
31		118 BN group from media and referrals from GP/MH workers (SCID confirmed)	SCID for DSM-II-R - diagnosis of social phobia (for BN group)	30.2%	26 (5.9)				Odds ratio BN vs control = 7.21	1.09
		98 control from electoral role		6.1%	35.5 (6.2)					

		(diagnosed from EAT and EDI)								
		645 control boys from schools (grade 9-12)		7.69 (4.5)						

Bold (primary measure used/effect size used in meta-analysis), EAT (Eating Attitudes Test), EDI (Eating Disorder Inventory), EDEQ (Eating Disorder Examination Questionnaire), FNE (Fear of Negative Evaluation), SPIN (Social Phobia Inventory), LSAS (Liebowitz social anxiety scale), SCID (Structure Clinical Interview for DSM), SADS (Schedule for Affective Disorders and Schizophrenia)

Table 2 – Study information for Correlation meta-analysis

No.	Study	Sample	ED outcome measure Mean (SD)	SA outcome measure Mean (SD)	Mean age (SD)	Mean BMI (SD)	% female	CASP score	Effect size from paper	r
1	Bianchi et al. (2024)	276 undergraduate students	2 items from binge eating disorder screening questionnaire 0.98 (1.5)	SAS for adolescents 45.99 (15.89)	20.2 (2.43)	21.61 (3.27)	69.3%	0.55	<i>r</i> = 0.32	0.32
2 (f) 3 (m)	Cerea et al. (2024)	128 young males	EDI-3 – drive for thinness 2.98 (4.38) Bulimia 3.37 (4.34) Body dissatisfaction 6.7 (6.26)	SIAS 21.32 (13.55)	23.88 (3.31)	NR	0%	0.82	NR	
		128 mothers	EDI-3 – drive for	SIAS	45.9 (4.49)		100%		<i>r</i> = 0.17 (Drive	0.17

			thinness 7.6 (6.94) Bulimia 2.67 (4.09) Body dissatisfaction 11.37 (9.16)	16.02 (11.5)					for thinness) Bulimia = 0.25 Body dissatisfaction = 0.18	
		128 fathers	EDI-3 – drive for thinness 4.39 (5.45) Bulimia-2.32 (4.57) Body dissatisfaction 6.98 (6.3)	SIAS 16.48 (12.19)	57.91 (4.92)		0%		r = 0.14 (Drive for thinness) Bulimia $r = 0.25$ Body dissatisfaction $r = 0.15$	0.14
4	Dang et al. (2024)	312 treatment seeking patients with AN	DSM severity definitions Mild=135, moderate=63, severe=49, extreme=63	MINI mild=21 SAD, moderate=5 SAD, Severe=7 SAD, Extreme= 2 SAD	26.9	16.8	94.6%	0.91	Cramers V = 0.283	0.163
5	Magson et al. (2023)	528 grade 6 students	CHEAT 5.05 (5.18)	Spence Children's Anxiety Scale 4.97 (3.43)	11.19 (0.55)	NR	49.9%	0.82	r = 0.36	0.36
6	Redden et al. (2022)	76 college students with elevated perfectionism (scoring above 29 on concerns about mistakes on Frost's multi-dimensional	EAT Intervention condition baseline 13.82 (9.09) Control condition baseline 12.03	SPI Intervention condition baseline 29.15 (13.08) Control condition baseline 30.08 (17.12)	20.1 (6.09) intervention 18.89 (6.09) control condition	NR	94.9% intervention 94.6% control	0.73	Baseline r = 0.07	0.07

		perfectionism scales) (39 intervention condition 37 control)	(9.63)							
7	Mukherjee & Hussain (2022)	411 undergraduates	EAT-26 8.06 (6.25)	SIAS 29.45 (10.806)	19.52 (1.27)	NR	24.5%	0.64	$r = 0.228$	0.228
8	Bilsky et al. (2022)	387 adolescents	CHEAT-26 25.16 (15.15)	Revised Child Anxiety and Depression Scale (RCADS) - social anxiety subscale 16.66 (6.52)	14.82 (1.11)	NR	47%	0.82	$r = 0.456$	0.456
9	Webb et al. (2021)	379 school students	Dutch Eating Behaviour Questionnaire (5 items from emotional eating subscale) - Time 1 2.01 (0.86)	SAS for Children – revised 2.22 (0.84)	12.0 (0.9)	18.45 (2.94)	56%	0.73	$r = 0.34$	0.34
10	Pleple et al. (2021)	222 patients with AN (155 entered into discharge correlational analysis)	EAT- 26 20.1 (17.1)	LSAS - fear subscale 23.24 (16.33)	20.9 (6.6)	17.11 (2.0)	NR	0.73	Discharge $r = 0.4$	0.4
11	Peleg et al. (2021)	613 Muslim adolescents	EAT -26 (hebrew and arabic) 15.17 (10.28)	SAS - revised (translated into hebrew and arabic) 2.35 (0.79)	15.4 (1.6)	21.42 (3.76)	64.3%	0.55	$r = 0.29$	0.29
12	Kaczurkin et al. (2021)	329 adults with primary	Clinical Impairment Assessment	SPI 23.04 (16.86)	31.32 (11.92)	NR	53.8%	0.91	$r = -0.36$	0.36

		diagnosis of an anxiety or anxiety-related disorder determined by DSM-5 criteria.	Questionnaire 11 (11.78)							
13	Williams & Levinson (2020)	300 undergraduates	EDEQ time point 1 1.33 (1.06)	SIAS time point 1 22.06 (12.23)	18.88 (1.07).	NR	100%	0.73	$r = 0.26$	0.26
14	Spettigue et al. (2020)	182 obese participants	EDEQ NR	MASC - social anxiety 2 subscale Obese/No binge eating 51.83 (12.57) Obese/Binge Eating 59.21 (12.38)	15.67 medium (13.03-17.88)	NR	53.8%	0.91	Odds ratio (clinically elevated levels of SA as predictor of binge eating) 1.77	0.156
		308 participants with eating disorders		Eating disorder No binge eating 61.95 (13.24) Eating disorder/Binge eating 65.77 (10.99)	15.47 (13.00-17.93)		93.8%			
15	Efe et al. (2020)	150 obese adolescents	emotional eating scale adapted for children and adolescents 76.66 (16.3)	SAS for children – revised 39.03 (13.09)	NR	2.26 (0.24) BMI-for-age?	53.3%	0.75	$r = 0.172$	0.172
16		150 healthy adolescents	emotional eating scale adapted for	SAS for children – revised		0.34 (0.49)	53.3%		$r = 0.104$	

			children and adolescents 65.68 (28.41)	31.44 (8.87)		BMI for age				
17	Bou-Kahil et al. (2020)	59 positive on SCOFF	SCOFF	Marks and Mathews scale/fear questionnaire - social anxiety subscale Median 8 (QR-1.2)	30.8 (12.2)	NR	45.7%	0.82	Odds ratio (adjusted) – 1.05	0.013
		72 no vulnerability to ED On SCOFF		Marks and Mathews scale/fear questionnaire - social anxiety subscale Median 3 (QR 8.75)	32.6 (11.9)		54.3 %			
18	Benau et al. (2020)	178 female undergraduates	EDI-3 – drive for thinness 9.89 (7.34) Bulimia-14.06 (9.41) Body dissatisfaction 3.77 (4.6)	SPI 18.17 (11.91)	19.3 (2.24)	NR	63.44%	0.91	<i>r= 0.273 (Drive for thinness)</i> bulimia <i>r</i> =0.273 body dissatisfaction <i>r</i> =0.321	0.273
19		101 male undergraduates	EDI-3 – drive for thinness 3.97 (4.64) Bulimia-3.01 (5.89) Body dissatisfaction 7.23 (5.89)	SPI 17.74 (12.1)					<i>r= 0.358 Drive for thinness</i> bulimia <i>r</i> =0.359 body dissatisfaction <i>r</i> =0.229	
20	Andersons et	135 young	CHEAT	SAS - child	12.6 (2.6)	2.6 (0.4)	53.3%	0.91	<u>Dieting subscale</u>	-0.05

	al (2020)	people	Dieting 3.0 (3.6) Food preoccupation 1.0 (1.9) Body concern 4.8 (3.6)	version/adolescent version fear of negative evaluation subscale -19.8 (9) SA in new situations 16.9 (5.6), SA in general situation 8.5 (3.5)					FNE $r = -0.05$ new sit ($r = -0.1$) general sit ($r = 0.08$) <u>weight concern subscale</u> FNE ($r = 0.29$) new sit ($r = 0.13$), general sit ($r = 0.27$) <u>food preoccupation</u> FNE ($r = 0.24$) new sit ($r = -0.13$) general sit ($r = 0.09$)	
21	Schneider et al. (2019)	400 undergraduates	EAT – 26 15.2 (13.6)	SPS 7.7 (6.2) (SIAS 7.5 (5.5))	19.63 (4.12)		77%	0.82	$r = 0.31$ (with SIAS 0.28)	0.31
22	Radix et al. (2019)	83 participants reporting ED	EDEQ 4.85 (1.62)	BFNE 45.21 (11.28)	19.81 (3.06)	19.81 (3.06)	100%	0.73	$r = 0.577$	0.577
23		323 participants reporting no psychiatric disorder	EDEQ 2.77 (1.43)	BFNE 36.26 (12.70)	22.1 (4.66)	22.1 (4.66)			$r = 0.533$	0.533
24	Peters et al. (2019)	7221 adults 16+	SCOFF (yes to both binge eating and purging) 1.41 (0.002)	Interview administered revised clinical interview schedule -social phobia 0.001% of sample met criteria for	51.0 (18.5)	NR	56.9%	0.91	odds ratio -14.9 (regression social phobia predicting binge eating and purging)	0.6

				social phobia						
25	Espel-Huynh et al. (2019)	625 adults presenting for ED treatment at residential facilities	EDEQ 4.06 (1.35)	anxiety sensitivity index - social concerns subscale 9.52 (3.18)	25.11 (10.67)	NR	100%	0.91	$r = 0.37$	0.37
26	Brosof et al. (2019)	264 undergraduate women	EDI-2 (Time point 1) -0.02 (2.423)??	SIAS T1 21.95 (12.31)	18.71 (1.05)	NR	100%	0.73	$r = 0.31$	0.31
27	Li (2018)	784 high school students	EAT-26 12.85 (4.74)	LSAS 53.27 (16.54)	17.12 (1.32)	21.47 (2.39)	51.8%	0.82	$r = 0.55$	0.55
28	Linardon et al. (2017)	393 adults	edeq restraint 1.78 (1.50) (Overevaluation of weight and shape (2.77 (2.15)))	LSAS 50.88 (30.32)	25.33 (8.19)	NR	77.1 %	0.82	$r = 0.22$ (Restraint) overevaluation $r = 0.34$	0.22
29	Ciarma & Mathew (2017)	282 participants	EAT-26 8.33 (8.67)	LSAS 51.27 (21.16)	22.36 (3.71)	NR	80.14%	0.91	$r = 0.36$	0.36
30	Levinson & Rodebaugh (2016)	300 undergraduate women	EDI-2 (T1) – drive for thinness 14.71 (6.66) Bulimia 13.63 (5.08) Body dissatisfaction 5.64(5.08)	BFNE T1 23.33 (6.94)	Median 18 (1.05)	NR	100%	0.82	$r = 0.31$ (Drive for Thinness) body dissatisfaction $r = 0.35$ Bulimia $r = 0.33$	0.31
31	Etkin et al. (2016)	643 undergraduates	Dutch Eating Behaviour Questionnaire - emotional eating subscale	SIAS 1.68 (0.78)	19.61 (1.25)	23.51 (4.19)	55.99%	0.82	$r = 0.25$	0.25

			2.31 (0.9)							
32	Cook-Cottone et al. (2016)	1391 children	EDI-3 Global boys 12.47 (11.95)	MASC - social anxiety subscale 7.30 (5.83)	11.76 (1.198)	Median percentile 61%	55%	0.73	Girls $r = 0.4$	0.4
33			EDI-3 Global girls 15.82 (15.05)	MASC – social anxiety subscale 9.32 (6.47)					Boys $r = 0.52$	
34	Arlt et al. (2016)	461 undergraduates	EDDS 18.35 (15.2)	SIAS 22.62 (13.01)	20.74 (3.45)	NR	63.12%	0.73	$r = 0.28$	0.28
35	Vine & Aldao (2014)	211 undergraduates	EAT-26 8.69 (8.67)	BFNE 32.25 (10.13)	18.7 (1.4)	NR	70.6%	0.55	$r = 0.38$	0.38
36	Dakanalis et al. (2014b)	359 italian men	EDI -2 -bulimia subscale, Yelland and Tiggemann's drive for masculinity scale – merged 45.33 (18.18)	interaction anxiousness scale 44.82 (20.09)	20.4 (3.3)	NR	0%	0.82	$r = 0.43$	0.43
37	Dakanalis et al. (2014a)	408 italian women	EDI-2- sum of drive for thinness and bulimia subscales 31.33 (14.14)	interaction anxiousness scale 32.02 (11.10)	20.82 (1.9)	20.97 (3.34)	100%	0.82	$r = 0.37$	0.37
38	Magallares (2013)	375 female students	EAT-26 NR	BFNE NR	26.51 (4.82)	21.75 (3.32)	100%	0.64	$r = 0.37$	0.37
39	Levinson et al. (2013)	Study 1 236 undergraduates	EDI 2 risk composite 0.1 (3.54)	BFNE 21.35 (7.08)	Median 19 (1.49)	24.15 (4.92)	74%	0.91	$r = 0.48$	0.48
40		Study 2 156 undergraduate women	EDI-2 risk composite-0.02 (2.5)	BFNE 19.42 (7.13)	Median 19 (4.3)	22.89 (4.8)	100%		$r = 0.42$	
41	Ostrovosky et al. (2013)	321 adults with BMI over 25	Questionnaire on Eating and Weight Patterns (Binge	SPIN (59% clinically significant social	33.7 (6.7)	36.0 (12.8)	86.8%	0.73	$r = 0.36$ (binge eating)	0.36

			eating) Emotional Eating Scale	anxiety)					$r=0.46$ (emotional eating)	
42	Sawaoka et al. (2012)	53 people with High SA seeking help with BED 60 people with low SA seeking help with BED	EDE global 2.96 (1) EDE global 2.6 (1.08)	SCS - social anxiety subscale NR	45.03 (8.3)	37.1 (7.3)	77.9%	0.73	$r=0.23$	0.23
43	Levinson & Rodebaugh (2012)	118 undergraduates	EDI-2 Drive for thinness NR	SPS NR SIAS 24.14	19.31 (1.2)	NR	62%	0.73	$r=0.27$ (Drive for Thinness) bulimia $r=0.21$ body dissatisfaction $r=0.3$	0.27
44	Peat & Muehlenkamp (2011)	214 college aged women	EDI-3 risk composite 36.25 (6.33)	BFNE 35.46 (9.35)	Median 19	NR	100%	0.91	$r=0.31$	0.31
45	Utschig et al. (2010)	2010 undergraduate women	EDDS bulimia scale 10.48 (6.98)	BFNE-II 15.8 (7.12)	19.66 (1.49)	NR	100%	0.82	$r=0.41$	0.41
46	Liao et al. (2010)	487 first year medical students	EAT-26 5.94 (5.09)	SIAS 24.82 (9.58)	18.47 (0.85)	10.16 (2.47)	63%	0.73	$r=0.21$	0.21
47	Schulze et al (2009)	23 females admitted to inpatient unit for first time with AN	EDI – Drive For Thinness subscale NR	SPAI 17.4 (9.7)	14.69 (1.54)	14.7 (1.58)	100%	0.64	$r= -0.15$ (drive for thinness) bulimia $r=0.63$ Body	-0.15

									dissatisfaction $r=0.06$	
48	Mayer et al. (2009)	301 adolescent females (Specialised education schools)	EDEQ 1.29 (1.21)	SPAI 76.8 (29.1)	17.7 (1.3)	21.9 (3.0)	100%	0.55	$r=0.3$	0.3
49	Kimbrel et al. (2008)	128 female college students	Bulimia test revised NR	SPS NR	18.84 (2.48)	NR	100%	0.64	R^2 SA predicting bulimia symptoms controlling for demographics = 0.12	0.35
50	Schutz & Paxton (2007)	327 young people	EDI – bulimia subscale 14.88 (6.19)	revised SCS- social anxiety subscale 7.96 (3.91)	15.9 (0.51)	22.08 (4.18)	100%	0.91	$r = 0.26$	0.26
51	McLean et al. (2007)	160 female undergraduates	EAT-40 14.13 (11.68)	SIAS 21.75 (11.49)	19.96 (1.2)	NR	100%	0.91	$r=0.2$	0.2
52	Buchholz et al. (2007)	149 adolescent girls diagnosed with an eating disorder	EDI-2 Drive for thinness 13.53 (6.84) Body dissatisfaction 16.49 (9.18)	MASC- social anxiety subscale 15.02 (7.17)	15.65 (1.17)	NR	100%	0.55	$r=0.5$ (Drive for thinness) Body dissatisfaction r =0.48	0.5
53	Rush et al (2005)	1376 people with major depressive disorder	Psychiatric Diagnostic Screening questions 12.4% Bulimia	Psychiatric Diagnostic Screening questions 29.3% SAD	43.4 (14.1)	NR	62.7%	0.91	Odds ratio of both diagnoses occurring 1.5	0.11

54 (AA) 55 (H)	Vander Wal & Thomas (2004)	139 girls in grade 4 and 5 (69 African American, 55 Hispanic, 15 other racial and ethnic classification)	CHEAT – 26 NR	SAS- FNE subscale NR	NR	NR	100%	0.73	African American $r=0.4$	0.4
									Hispanic $r=0.37$	0.37
56	Gilbert & Meyer (2003)	80 female university students	EDI 2 - risk composite Drive for thinness 6.56 (6.34) Body Dissatisfaction 13.3 (8.23) Bulimia 1.98 (3.25)	FNE 16.3 (6.74)	12.5 (2.56)	21.1 (2.2)	100%	0.82	$r=0.43$ (drive for thinness) body dissatisfaction $r=0.41$ bulimia $r=0.27$	0.43
57	Striegel- Moore et al., (1993)	22 women	EAT-26 10.61 (9.6)	SCS - social anxiety subscale 17.53 (5.28)	22.53 (6)	22.22 (3.87)	100%	0.73	$r=0.15$	0.15

Bold (primary measure used/effect size used in meta-analysis), NR (not reported), EAT (Eating Attitudes Test), EDI (Eating Disorder Inventory), CHEAT (Children's Eating Attitudes Test), EDEQ (Eating Disorder Examination Questionnaire), EDDS (Eating Disorder Diagnostic Scale), FNE (Fear of Negative Evaluation), BFNE (Brief Fear of Negative Evaluation), SIAS (Social Interaction Anxiety Scale), SCS (Self-Consciousness Scale), SPAI (Social Phobia and Anxiety Inventory), SPS (Social Phobia Scale), LSAS (Liebowitz Social Anxiety Scale), SAS (Social Anxiety Scale), MASC (Multidimensional Anxiety Scale for Children)

Summary measure and data synthesis

Meta-Essentials (Van Rhee et al., 2015) was used to complete two random-effects meta-analyses. For the correlational meta-analysis, effect sizes were converted to Pearson's r ; for the independent groups meta-analysis, effect sizes were converted to Hedges g .

To assess the strength of relationships reported in this meta-analysis, Cohen's (1992) guidelines were used - Pearson's r of 0.1 indicates a small effect, 0.3 a medium effect, and 0.5 a large effect, while Hedges g of 0.2 indicates a small effect, 0.5 a medium effect and 0.8 a large effect (Cohen, 1992). The criteria for statistical significance was set at an alpha value of <0.05 .

For the correlational meta-analysis, one effect size (or two where the study had separated out the effect sizes into independent groups, e.g. males and females) was included in the meta-analysis. For the independent groups meta-analysis, multiple effect sizes using different comparisons (e.g. Bulimia vs control and Anorexia vs control) were extracted from the study to ensure diagnostic group comparisons could be made.

Heterogeneity

Heterogeneity was tested using the Q-test and I^2 statistic. I^2 values of 25% variance were interpreted as low variance, 50% as moderate variance and 75% as high variance (Higgins et al., 2003). Forest plots were used to visualise effect sizes and confidence intervals.

Moderation and subgroup analysis were run when tests of heterogeneity yielded significant results. Most moderators and sub-groups were identified a priori; however, some additional moderators and sub-groups were analysed to explain the heterogeneity. Subgroup analyses were only run if there was more than three studies

per group (Card, 2012).

Publication bias

Publication bias was assessed using a funnel plot, which visually displays the relationship between study effect sizes and their standard errors. When asymmetry was observed in the funnel plot, the trim-and-fill method was applied to estimate and adjust for potentially missing studies. In addition, Egger's regression test and Kendall's tau were conducted to statistically evaluate funnel plot asymmetry. Egger's regression assesses whether there is a systematic relationship between study precision and effect size, which might indicate bias, while Kendall's tau provides a non-parametric measure of rank correlation between effect size and study variance. Finally, publication bias was also assessed using Rosenthal's fail-safe N (Rosenthal, 1979), which estimates the number of unpublished studies required to change the significant effect size into a non-significant one.

Results

Group meta-analysis

The data analysed from 25 studies with 36 effect sizes included a total sample size of 7448 participants. The random-effects model revealed that when comparing groups (i.e., eating psychopathology in socially anxious populations vs control, or social anxiety in eating disordered populations vs control), the overall group difference was Hedge's $g = 0.86$ (95% CI 0.66-1.06, $z = 8.22$, $p < 0.001$), indicating a large effect size. The forest plot is displayed in Figure 2.

The funnel plot presented in Figure 3 was used to assess the potential presence of publication bias in this meta-analysis. The plot displays visible asymmetry, suggesting publication bias. Egger's regression test ($t = 3.96$, $p < 0.001$) and Kendall's

Tau ($\tau = 0.41$, $p < 0.001$), suggested significant publication bias. When the trim and fill method was used (5 studies imputed), the adjusted Hedge's g was 0.54 (0.29-0.80), indicating a moderate effect size. Rosenthal's fail-safe N indicated that 6,667 missing studies with null results would be required to reduce the observed effect to non-significance, suggesting the findings are robust and unlikely to be due to publication bias.

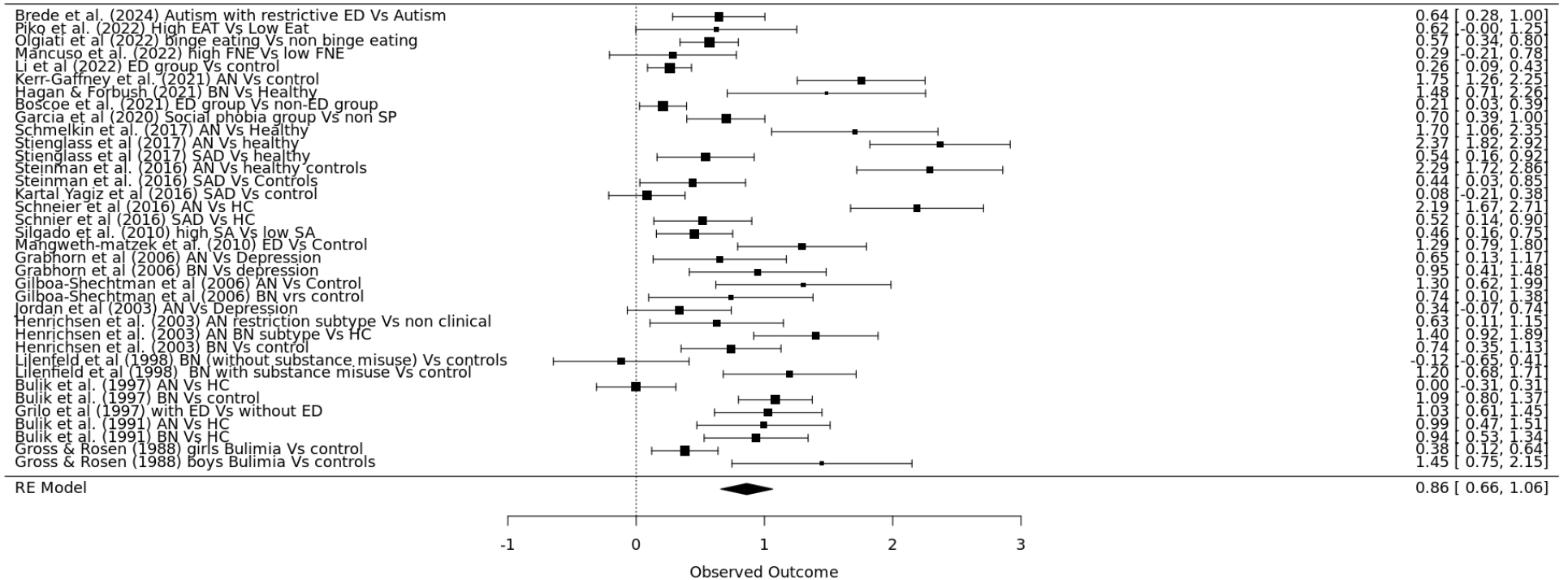


Figure 2 - Group Forest Plot

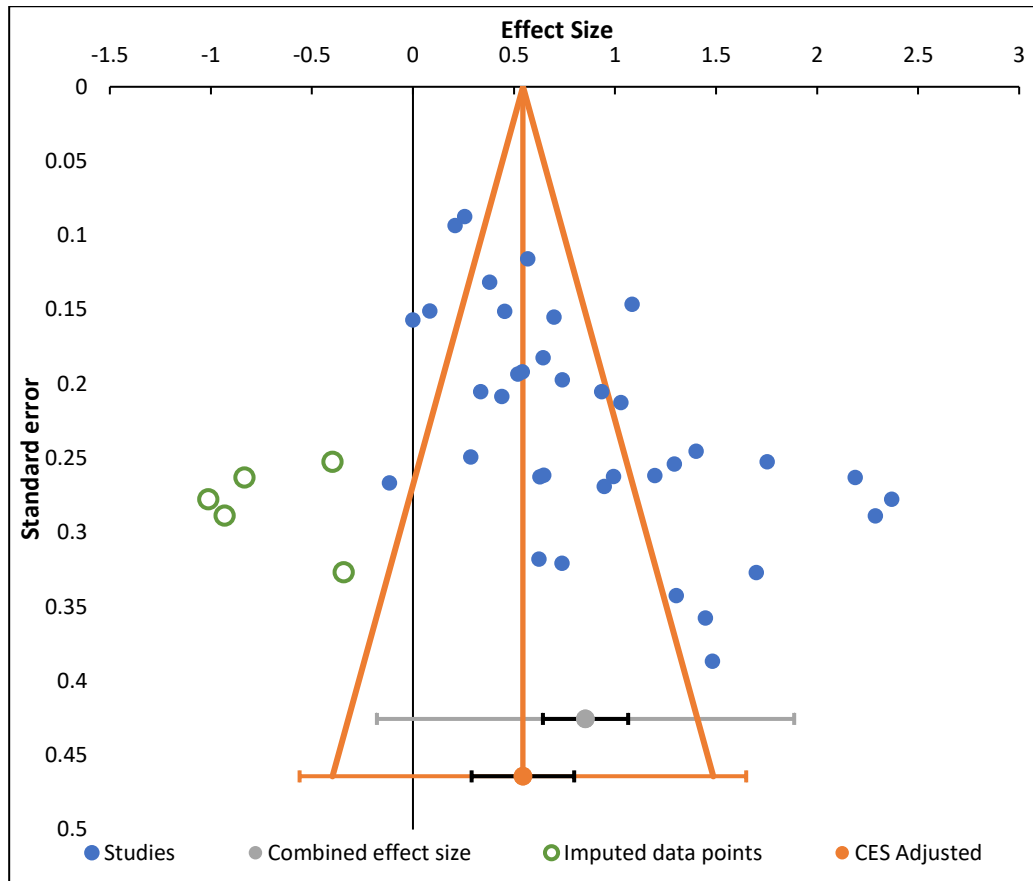


Figure 3– Group Funnel Plot

Moderator and Sub-Group Analysis

There was evidence of significant heterogeneity ($Q(36) = 278.55$, $p < 0.001$ and $I^2 = 87.43\%$). Therefore, moderator and subgroup analyses were performed to explain this heterogeneity.

Subgroup analysis (Table 3) found that the effect size was significantly bigger when comparing social anxiety in eating disorder populations versus comparison groups, rather than comparing eating psychopathology in socially anxious groups against comparison groups, which explained 27.79% (pseudo r^2) of heterogeneity (Table 3). Additionally, the use of Liebowitz Social Anxiety Scale as the outcome variable produced bigger effect sizes than the Social Phobia Inventory and other measures of social anxiety, which explained 50.28% (pseudo r^2) of the variance (Table

3). Finally, social anxiety was significantly higher in groups with Anorexia Nervosa than in groups with Bulimia Nervosa and other eating disorders, when compared to healthy controls/comparison groups (pseudo r^2 18.71%). Interview and self-report measures of social anxiety did not produce significant different findings. The effect of gender and comparisons between adult populations and child populations could not be completed, due to limited studies considering exclusively males or children.

Table 3 – Group Sub-Group Analysis

Subgroup	Sum of squares	df	p	Included studies	Hedges g	Heterogeneity	R ²
LSAS vs SPIN vs other self-report SA measure	19.86	2	<0.001	22	LSAS 1.78 (1.35 - 2.22) SPIN 0.66 (0.3-1.02) Other SA self-report measure 0.75 (0.50-0.99)	I^2 73.17%, Q 22.36 (p=0.001) I^2 82.91%, Q=17.56 (p=0.001) I^2 75.30%, Q 40.49 (p<0.001)	50.28%
ED vs control/ SAD vs control	14.59	1	<0.001	36	ED vs control 0.97 (0.73-1.21) SAD/high social anxiety vs controls 0.43 (0.28-0.59)	ED vs control I^2 89.20%, Q 259.31 (p<0.001) SAD/high SA vs control I^2 34.66%, Q= 9.18 (p =0.164)	27.79%
AN vs comparison group/ BN vs comparison group/ Eating psychopathology group vs comparison group	6.01	2	0.049	29	AN 1.29 (0.84-1.74) BN 0.85 (0.56-1.14) ED group 0.6 (0.32 -0.89)	AN I^2 91.90%, Q 135.77 (p<0.001) BN I^2 74.47%, Q 35.26 (p<0.001) ED group I^2 81.36%, Q 33.20 (p<0.001)	18.71%
SA measure self-report vs interview	2.76	1	0.097	30	Interview 0.60 (0.31-1.07)	Interview I^2 86.15%, Q 50.55 (p<0.001)	6.32%

	Self-report 1.07 (0.79-1.34)	Self-report I^2 89.94%, Q 208.79, ($p < 0.001$)
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LSAS (Liebowitz Social Anxiety Scale), SPIN (Social Phobia Inventory), ED (eating disorder), SAD (Social Anxiety Disorder), AN (Anorexia Nervosa), BN (Bulimia Nervosa), SA (social anxiety)

Moderators were also examined (Table 4). CASP score, number of participants and year of publication were not significant moderators. Due to limited reporting, BMI could not be used as a moderator.

Table 4 – Group Moderator Analysis

Moderator	beta	Z value	P value	R ²
Year of publication	0.07	0.43	0.666	0.43%
CASP	-0.07	-0.47	0.635	0.52%
Number of participants	-0.27	-1.88	0.060	7.46%

Correlation meta-analysis

A forest plot is displayed in Figure 4 to represent the correlations between social anxiety and eating psychopathology. The data analysed from 50 studies with 57 effects included a total sample size of 24,635 participants. The random-effects model revealed a significant moderate association between social anxiety and eating psychology ($r = 0.32$, 95% CI 0.28-0.36, $z = 15.12$, $p < 0.001$).

The funnel plot presented in Figure 5 is used to assess the potential presence of publication bias in the meta-analysis. The plot displays a generally symmetrical distribution of studies around the combined effect size, which suggests an absence of strong publication bias. Egger's regression test did suggest significant publication bias ($t = -2.33$, $p = 0.02$), but Kendall's Tau did not support that interpretation ($\tau = 0.04$, $p = 0.645$). Trim and fill analysis was applied, but no studies were imputed and the effect

size did not need to be adjusted. Rosenthal's fail-safe N indicated that 49,066 missing studies with null results would be required to reduce the observed effect to non-significance. Therefore, there seems to be limited publication bias.

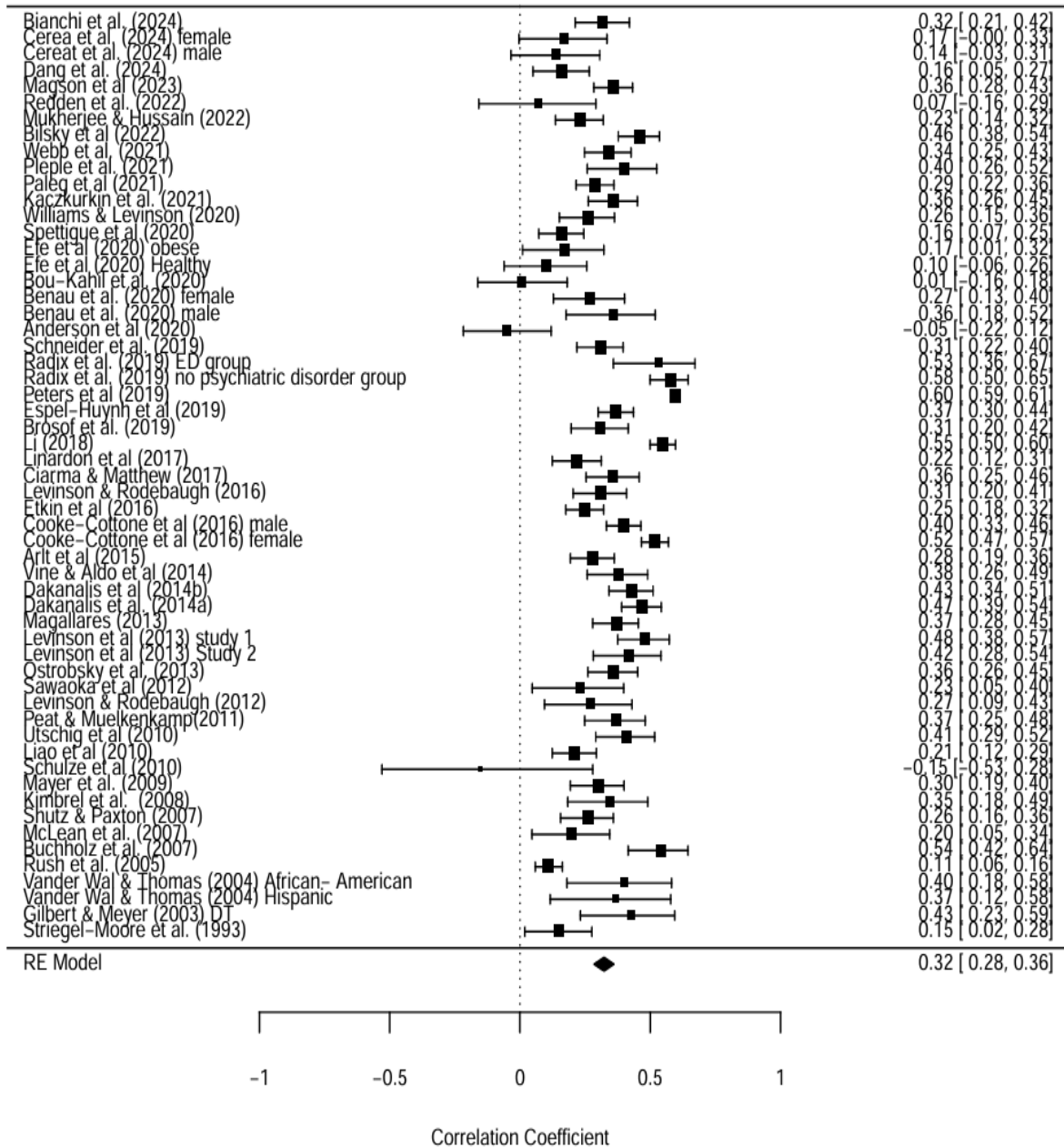


Figure 4 - Correlation Analysis Forest Plot

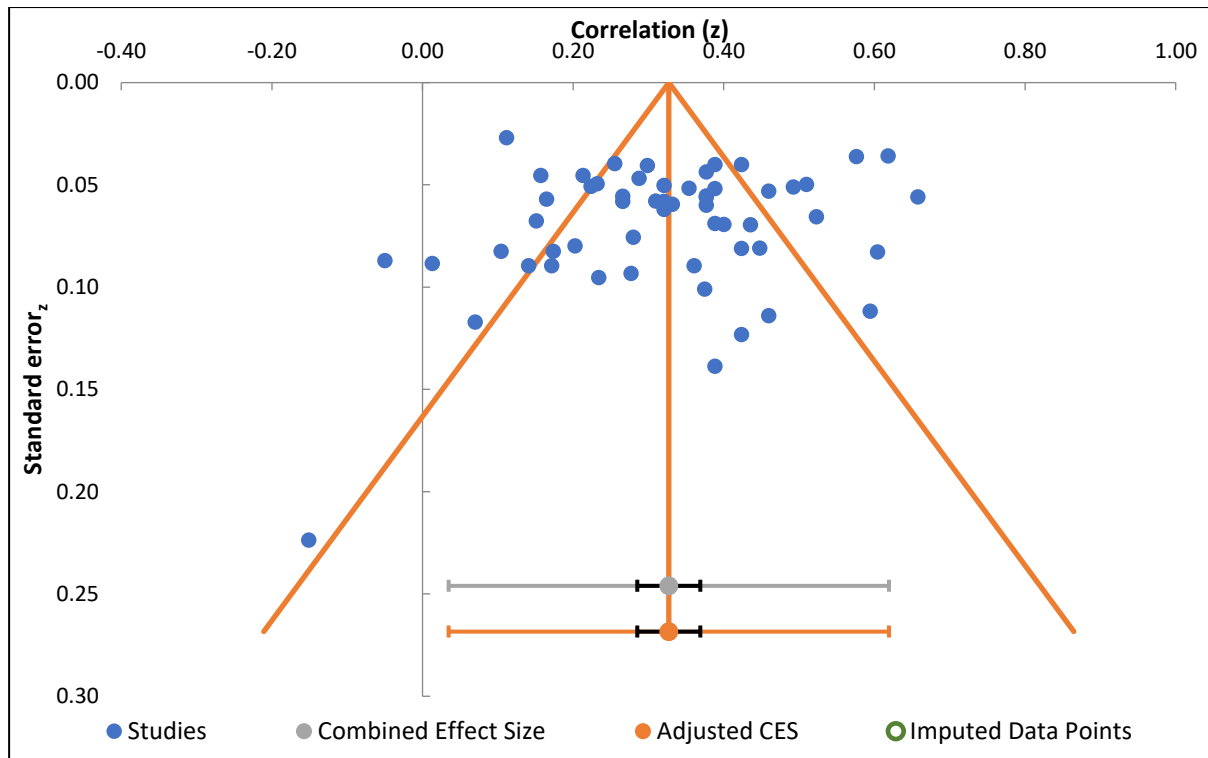


Figure 5 - Correlation Analysis Funnel Plot

Moderator and Sub-group analysis

There was evidence of significant heterogeneity ($Q(56) = 1056.29$, $p < 0.001$ and $I^2 94.70\%$). Therefore, moderator and subgroup analyses were performed to probe the source of heterogeneity among the associations of social anxiety and eating psychopathology.

Sub-group analysis (Table 5) found that using fear of negative evaluation measures produced significantly higher effect sizes than other social anxiety measures, which explained 23.45% (pseudo r^2) of heterogeneity. Comparing subgroups of clinical eating disorder samples with non-clinical samples, adult populations with child populations, female populations with male populations and comparisons of eating psychopathology measures did not produce significant findings (Table 5). Eating disorder diagnostic groups could not be compared, due to limited studies separating out effect sizes by diagnosis.

Table 5 – Correlation Subgroup Analysis

Subgroup	Sum of squares	df	p	Number of studies included	Correlations (r) and 95%CI	Heterogeneity	R ²
FNE vs other measure	9.20	1	0.002	57	FNE 0.43 (0.36 - 0.49) other SA measures 0.30 (0.25-0.34)	FNE (I ² 63.23%, Q 24.48 (p=0.004) (I ² 95.54%, Q 1031.43 (p<0.001)	23.45%
Adult vs child populations	0.00	1	0.944	57	Adult 0.32 (0.28-0.36) child 0.32 (0.23-0.41)	Adult (I ² 95.52%, Q 870.72 (p<0.001) Child (I ² 90.47%, Q=167.87 (p<0.001)	0.01%
Clinical ED group vs non-clinical	0.00	1	0.946	54	clinical 0.32 (0.14-0.47) non-clinical 0.32 (0.28-0.36),	Clinical (I ² 85.30%, Q 47.63 (p<0.001)) non-clinical (I ² 86,80%, Q 341.02 (P<0.001),	0.01%
EAT vs EDI vs EDEQ vs other ED measure	2.56	3	0.464	57	EAT 0.31 (0.23-0.38) EDEQ (0.35 (0.19-0.49) EDI 0.37 (0.3-0.43)), other 0.28 (0.20-0.36)	EAT (I ² 86.92%, Q 122.35 (p<0.001) EDEQ (I ² 90.38%, Q 62.35 (p<0.001), EDI I ² 77.5%, Q=71.11, p<0.001) other (I ² 97.80%, Q 681.39 (p<0.001)	5.37%
Female vs male	0.03	1	0.866	28	female 0.36 (0.30-0.42), male 0.35 (0.15-0.53)	female (I ² 79.49%, Q 112.15 (p<0.001) male (I ² 70.23%, Q 10.08 (p=0.018))	0.10%

FNE (Fear of Negative Evaluation), ED (eating disorder), EAT (Eating Attitudes Test), EDI (Eating Disorder Inventory), EDEQ (Eating Disorder Examination Questionnaire)

Moderators were also examined (Table 6). Number of participants was a significant moderator, with larger studies giving higher effect sizes. However, one large study (Peters et al., 2019) seemed to influence this outcome substantially. When this study was removed, the number of participants was no longer a significant moderator (Table 6). CASP score and year of publication were not significant moderators (Table 6). Due to limited reporting, BMI could not be used as a moderator.

Table 6 – Correlation Moderator Analysis

Moderator	beta	Z value	P value	R²
Year of publication	0.02	0.17	0.866	0.05%
CASP	-0.06	-0.42	0.672	0.35%
Number of participants	0.34	2.52	0.012	11.32%
Number of participants without Peters et al. (2019)	0.09	0.61	0.542	0.74%

GRADE ratings

Table 7 shows the evidence of quality for both the correlation meta-analysis and the independent group meta-analysis was downgraded two levels to low quality. The correlation and independent group meta-analyses were downgraded for imprecision as confidence intervals crossed the threshold into small effect sizes. The correlational meta-analysis was also downgraded due to significant unexplained heterogeneity. The independent group meta-analysis was downgraded for indirectness due to significant variability across comparison types.

Table 7 – Grade Ratings

Criteria	Correlational Meta-Analysis		Group Meta-Analysis	
	Concerns	Rationale	Concerns	Rationale
Imprecision	Serious concerns (downgrade 1)	Confidence interval crosses threshold into small correlation	Serious concerns (downgrade 1)	Adjusted confidence interval crosses into small effect size
Inconsistency	Serious concerns (downgrade 1)	Evidence of heterogeneity and only some variation can be explained	No concerns	Evidence of heterogeneity, but moderator and subgroup analysis can be used to explain this variation
Indirectness	No concerns	Although studies looked at different populations it is still in keeping with question	Serious Concerns (downgrade 1)	Difference outcomes for ED Vs control/SAD Vs control and for different diagnostic groups.
Risk of bias	No concerns	CASP used and CASP score did not moderate relationship	No concerns	CASP used and CASP score did not moderate relationship
Publication Bias	No concerns	Trim and fill did not need to impute studies, Rosenthal fail safe n is high	No concerns	Publication bias evident but trim and fill used to adjust for this, Rosenthal fail-safe n is high

Discussion

This study

Social anxiety and eating psychopathology commonly co-occur. However, the magnitude of this relationship has not previously been fully examined using meta-analytical techniques, and among non-clinical groups. To fill this gap in the literature, the present study summarized existing quantitative evidence linking social anxiety and eating psychopathology.

Results suggest a moderate association between social anxiety and eating psychopathology. The Fear of Negative Evaluation scale produced significantly larger associations than other social anxiety measures. The fact that no evidence was found to support the moderating role of gender, age, or clinical status in terms of eating disorders in the correlational meta-analysis suggests that the association between social anxiety and eating psychopathology is largely consistent across individuals with different socio-demographic characteristics.

Additionally, while having an eating disorder diagnosis was associated with higher social anxiety than those in non-clinical groups with a large effect, diagnostic subgroup was also relevant. Those with anorexia nervosa had the highest levels of all those with eating disorders. This finding is in keeping with Kerr-Gaffney's 2018 meta-analysis. The Liebowitz Social Anxiety Scale produced significantly higher group differences than other social anxiety measures. Eating psychopathology was also significantly higher in social anxiety groups in comparison to control groups, with a small to medium effect size. These findings reinforce the notion that there is a strong relationship between social anxiety and eating psychopathology.

Relationship to the wider literature

As group differences were more pronounced when comparing levels of social anxiety in individuals with eating disorders versus controls - rather than when comparing eating psychopathology in highly socially anxious individuals versus controls - this study provides additional support for the theory that social anxiety might precede and contribute to the development of eating psychopathology (Godart et al., 2000; Kerr-Gaffney et al., 2018; Swinbourne et al., 2012). This conclusion reinforces the suggestion that social anxiety is a vulnerability factor for eating psychopathology (Pallister & Waller, 2008).

One possible explanation for elevated social anxiety in individuals with Anorexia Nervosa is the impact of starvation-related symptoms, such as social withdrawal (Fairburn et al., 2003). Social withdrawal might maintain and exacerbate social anxiety over time (Hofmann & Hay, 2018). Additionally, elevated social anxiety in people with Anorexia Nervosa might be driven by elevated perfectionism (Barber et al., 2025), which has been proposed as a linking factor of social anxiety and eating psychopathology (Silgado et al., 2010).

Understandably, the correlation between social anxiety and eating psychopathology was lower than the correlation found for social appearance anxiety and eating psychopathology (Alcaraz-Ibanez et al., 2023). This is in keeping with research suggesting that while social appearance anxiety is related to social anxiety and eating psychopathology separately, it might act as a linking mechanism between the two (Levinson & Rodebaugh, 2012; Jin et al., 2022)

The results from this meta-analysis suggest that the association between eating psychopathology and social anxiety can be over- or under-estimated, depending on the measure used. It is not surprising that the Fear of Negative Evaluation scale

(Leary, 1983) had stronger associations with eating psychopathology than other social anxiety measures, given that fear of negative evaluation is considered a vulnerability factor for both social anxiety and eating psychopathology (Levinson & Rodebaugh, 2012) or an important mediator between the two (Menatti et al., 2015). Fear of negative evaluation is a cognitive aspect of social anxiety, suggesting the cognitive aspect of social anxiety might be more associated with eating psychopathology than somatic or affective components (Wonderlich-Tierney & Vander Wal, 2010).

Studies using the Liebowitz Social Anxiety Scale (Liebowitz, 1987) also produced greater group differences between eating disorder populations and controls in comparison to studies that used other social anxiety measures, which is also in line with Kerr-Gaffney's (2018) meta-analysis. Whilst this could be because the Liebowitz Social Anxiety Scale assesses distress about eating and drinking in public, which is a feature common in people with eating psychopathology (Levinson et al., 2018), it could also be because the scale focuses on behavioural avoidance and cognitive fear rather than somatic symptoms (Rytwinski et al., 2009). Somatic symptoms of social anxiety might be less evident in eating disorder populations, given the reduced sensitivity to interoceptive signals reported in eating disorders (Jenkinson et al., 2018).

Limitations of the research

Many of the studies included in the correlational meta-analysis relied on undergraduate samples, which limits the generalisability of the findings, as this population tends to report higher levels of psychological distress than the general population (Granieri et al., 2021). Future research should explore the relationship between social anxiety and eating psychopathology across a broader age range to assess whether these associations hold across the lifespan. Additionally, power analyses were often unreported, raising concerns that some studies might have been

underpowered and therefore less reliable.

In the case-control studies, many studies did not use matched control groups, increasing the risk of confounding variables that might have influenced group differences. Additionally, due to the limited number of studies specifically focusing on Binge Eating Disorder, Avoidant Restrictive Food Intake Disorder, and Otherwise Specified Feeding and Eating Disorders, it was not possible to examine social anxiety within these diagnostic categories independently. Instead, these groups were combined into a broader “eating disorders” category, reducing diagnostic specificity and limiting the ability to conclude disorder-specific patterns of social anxiety. Finally, the majority of the studies included in the meta-analyses used Western samples, which limits the generalisability of these findings. Further research is needed to explore the association between social anxiety and eating psychopathology in non-western populations.

Limitations of this meta-analysis

It is particularly noteworthy that the overall strength of the current body of evidence was downgraded due to imprecision and inconsistency in the correlational meta-analysis, and due to imprecision and indirectness in the independent group meta-analysis. Moreover, this meta-analysis only included studies published in English and forward and backward citations searches were not used, which could have limited the number of included papers. In addition, many studies did not report key participant characteristics, such as BMI. As a result, BMI could not be included as a moderator variable in this meta-analysis - a limitation also noted in Kerr-Gaffney's (2018) review - reducing the ability to examine its potential influence on the association between social anxiety and eating psychopathology.

Future research suggestions

Further research is needed to clarify how strongly different aspects of social anxiety correlate with eating psychopathology. Additionally, research into social anxiety in populations with binge eating disorder, Otherwise Specified Feeding and Eating Disorders and Avoidant/Restrictive Food Intake Disorder are lacking. To ensure research into associations between social anxiety and eating psychopathology is not over-estimating the association, researchers should use social anxiety measures that assess behavioural, cognitive and somatic components of social anxiety, such as the Social Phobia Inventory (Connor et al., 2000).

Clinical Implications

As social anxiety and eating psychopathology comorbidity is linked with more severe eating psychopathology (Espel-Huynh et al., 2018; Kerr-Gaffney et al., 2018; Smith et al., 2018), it is important to assess both social anxiety in eating-disordered individuals and eating psychopathology in socially anxious individuals. It is also important to consider interventions that target both social anxiety and eating psychopathology, such as focused interventions on the transdiagnostic factor of fear of negative evaluation (DeBoer et al., 2013; Levinson & Rodebaugh, 2012; Trompeter et al., 2019). Whilst cognitive behavioural therapy for social anxiety and eating psychopathology is recommended (National Institute of Health and Care Excellence 2013; 2020), research into targeted interventions for fear of negative evaluation are lacking (Li et al., 2025). Behavioural experiments are likely to be particularly helpful for targeting fear of negative evaluation as they are among the most powerful change methods (Bennett-Levy et al., 2004; Bennett-Levy, 2003). Surveys, a type of behavioural experiment, to test patients' beliefs about what other people think, could be particularly useful to target fear of negative evaluation (Auyeung et al., 2020;

Murray et al., 2022).

Conclusion

This meta-analysis highlights a moderate and consistent association between social anxiety and eating psychopathology across diverse populations. When comparing social anxiety levels with controls, people with Anorexia Nervosa display higher levels of social anxiety than people with Bulimia Nervosa and other eating disorders. The review also found that how social anxiety is assessed can shape findings, meaning that measures of social anxiety should be carefully considered in future research and clinical work. Clinically, the findings underscore the need for interventions targeting shared features of social anxiety and eating psychopathology - particularly fear of negative evaluation.

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Appendices

Appendix 1: Search Strategy

Scopus

Key words - "social phobia*" OR "social anxiety"
AND

"anorexi*" OR "bulimi*" OR "binge eat*" OR "avoidant restrictive food intake disorder" OR
"ARFID" OR "otherwise specified feeding and eating disorder" OR "OSFED" OR "eating
disorder not otherwise specified" OR "EDNOS" OR "eating psychopathology" OR "eating
attitude*"

Psychinfo

Key words - "social phobia*" OR "social anxiety"
AND

"anorexi*" OR "bulimi*" OR "binge eat*" OR "avoidant restrictive food intake disorder" OR
"ARFID" OR "otherwise specified feeding and eating disorder" OR "OSFED" OR "eating
disorder not otherwise specified" OR "EDNOS" OR "eating psychopathology" OR "eating
attitude*"

Subject heading: social anxiety OR social phobia
AND
eating disorders OR binge eating disorder OR anorexia nervosa OR bulimia OR avoidant and
restrictive food intake disorder OR binge eating OR eating attitudes OR eating behaviour

Medline

Key words - "social phobia*" OR "social anxiety"
AND

"anorexi*" OR "bulimi*" OR "binge eat*" OR "avoidant restrictive food intake disorder" OR
"ARFID" OR "otherwise specified feeding and eating disorder" OR "OSFED" OR "eating
disorder not otherwise specified" OR "EDNOS" OR "eating psychopathology" OR "eating
attitude*"

Subject headings: social phobia
AND
anorexia nervosa OR avoidant and restrictive food intake disorder OR binge-eating disorder
OR bulimia nervosa

Appendix2: CASP checklists

Case control

[illegible]

Body image surveys to address social appearance anxiety in females at risk of eating psychopathology: An acceptability, feasibility and preliminary effectiveness study, using a wait-list randomized controlled design

Abstract

Objective: In the field of eating disorders and body image disturbance, surveys are a form of behavioural experiment, designed to test patients' beliefs that they can 'mind-read' what others think about their appearance and what it says about them. However, this intervention has not developed an independent evidence base. The study investigated the feasibility, acceptability and preliminary effectiveness of a body image survey intervention for females at risk of eating psychopathology.

Design: A randomised wait-list control design was used to address the study aims. The study had ethical clearance, was preregistered and met recruitment targets based on sample size analysis.

Methods: Twenty-eight participants completed the intervention, having been randomly allocated to either the immediate or the wait-list condition. Measures of social appearance anxiety, eating psychopathology, body image and psychological distress were administered every week for three weeks and then at the follow-up four weeks later.

Results: The wait-list control design met all criteria for feasibility and acceptability. Preliminary outcome evidence suggests body image surveys are particularly effective at reducing social appearance anxiety ($d = 1.79$). Body image distress also had significant Time x Group interactions but failed to meet significance at pairwise comparison. Whilst global eating psychopathology, drive for thinness and shape and weight overvaluation reduced over time, no significant interaction effects with group

was found.

Conclusions: While a full trial is needed to add to this evidence, body image surveys appear to be an acceptable and beneficial treatment for people with high levels of social appearance anxiety.

Practitioner Points

- Body image surveys are deemed acceptable by patients.
- Surveys are strongly effective at reducing social appearance anxiety.
- Body image surveys should be used in clinical practice to target social appearance anxiety.

Body image surveys to address social appearance anxiety in females at risk of eating psychopathology: An acceptability, feasibility and preliminary effectiveness study, using a wait-list randomized controlled design

Eating disorders are severe mental health conditions, associated with significant physical and psychological impairment (Crow et al., 2009; Jenkins et al., 2011; Pohjolainen et al., 2016). The lifetime prevalence of eating disorders in western countries is around 1.89%, and as high as 2.58% in females (Qian et al., 2021). However, the prevalence is much higher when subthreshold eating disorders are included, with estimates suggesting over 10% of young women meet criteria for eating disorders and subthreshold eating disorders (Stice et al., 2009; Stice et al., 2013). Additionally, it has been estimated that the prevalence of the adult population displaying signs of an eating disorder is around 6.4% (Jacob et al., 2018). Eating disorders are associated with increased mortality (Crow et al., 2009). They also have a long-lasting impact on quality of life, even after symptom remission (Pohjolainen et al., 2016).

Eating disorders manifest in various forms, all marked by unhealthy eating patterns driven by psychological factors. These can include extreme food restriction, emotionally motivated eating or avoidance, episodes of overeating or binge eating, and purging behaviours. Common diagnoses include anorexia nervosa (AN), bulimia nervosa (BN), binge eating disorder (BED), avoidant/restrictive food intake disorder (ARFID), and other specified feeding and eating disorders (OSFED) (American Psychiatric Association, 2022). Efficacy of treatment is modest in adults with AN, BN and BED (Eddy et al., 2017; Linardon, 2018; Monteleone et al., 2022; Treasure et al., 2020; Zipfel et al., 2015), and early detection and intervention are viewed as key to

improve outcomes and promote full recovery (Schmidt et al., 2016; Treasure et al., 2020).

Cognitive behavioural therapy for eating disorders (CBT-ED) is one of the most strongly evidence-based treatments for adults (Academy for Eating Disorders; 2020; Monteleone et al., 2022; National Institute of Health and Care Excellence, 2020; Slade et al., 2018). Addressing body image concerns is a central component of CBT-ED, given the critical role of such concerns in both the development and maintenance of eating disorders (Emanuelli et al., 2012; Fairburn, 2008; National Institute of Health and Care Excellence, 2020; Treasure et al., 2020; Waller & Beard, 2024; Waller et al., 2019). Interventions targeting body image are particularly important, as they not only enhance the likelihood of recovery but also reduce the risk of relapse (Keel et al., 2005; Waller et al., 2019). CBT-ED uses a range of methods to address different manifestations of body image distress, such as exposure to address body avoidance and behavioural experiments to address body checking (Waller et al., 2019).

Eating psychopathology and social appearance anxiety

Social appearance anxiety is a type of anxiety people experience when they fear that other people are judging their appearance, including their body shape, negatively (Hart et al., 2008). It is most common in women (Hart et al., 1989; Kowalski et al., 2006), with around 99% of female adolescents reporting some social appearance anxiety in the last year (Kowalski et al., 2006). Social appearance anxiety is associated with mental health difficulties, such as social phobia (Levinson et al., 2013), generalised anxiety disorder (Pritchard et al., 2021) and depression (Alcaraz-Ibáñez & Sicilia, 2020). A recent meta-analysis suggests that social appearance anxiety is also strongly related ($r = .51$) to eating psychopathology

(Alcaraz-Ibáñez et al., 2023).

As a central feature across eating disorders is the overevaluation of body shape or weight (Grilo, 2013), it is not surprising that eating psychopathology and social appearance anxiety commonly co-occur. Social appearance anxiety has been particularly linked with drive for thinness (Pritchard et al., 2021) and body image concerns (Atalau & Gençöz, 2008). People who experience high levels of social appearance anxiety are vulnerable to engaging in disordered eating and exercise as a safety behaviour to modify their appearance (Sabiston et al., 2007). This safety behaviour can have a short-term positive impact, such as helping the person to avoid negative social evaluations, but can have negative long-term implications, such as the development of an eating disorder. Additionally, social appearance anxiety seems to predict binge eating in undergraduate women (Brosos & Levinson, 2017). Therefore, it has been proposed that social appearance anxiety is a vulnerability factor for eating disorders (Alcaraz-Ibáñez et al., 2023). Social appearance anxiety also seems to play a role in the maintenance of disordered eating (Alcaraz-Ibáñez et al., 2023; Kowalski et al., 2006; Lanfranchi et al., 2015; Sabiston et al., 2014), as it is linked with key maintaining behaviours in poor body image - body checking (Haase et al., 2007; White & Warren, 2014), avoidance (Sabiston et al., 2007), mindreading (Waller et al., 2019), and body comparison (Sabiston et al., 2007). Therefore, social appearance anxiety seems to be a key target for intervention.

Use of surveys for social appearance anxiety

A survey is a type of behavioural experiment, which is used in cognitive behavioural therapy to test patients' beliefs about what other people think ('mind-reading'). Surveys involve generating questions with the patient to test the distressing belief (e.g., "They think I am boring, but they would never tell me"; "They

must think I am fat and unattractive”), and then inviting feedback on these questions from other people (e.g., people who do not know the person) (Murray et al., 2022). For example, a patient might pose a question such as: “On a scale of 1-10, where 1 is very unattractive and 10 is very attractive, how attractive do you think this person’s body is?”. The patient would be asked what they predict others would say, and that belief is then tested by comparing the patient’s prediction against others’ actual ratings and comments.

Surveys have the potential to be a helpful technique to address social appearance anxiety, as people with high levels of social appearance anxiety often do not ask what other people think of their bodies (a safety behaviour), due to fears that their beliefs will be confirmed. Therefore, while they are not exposed to potential distress, they are also not exposed to any corrective information - for example, that other people do not judge their body as harshly as they believe (Murray et al., 2022).

Surveys are commonly used in social phobia, but they are an underutilised intervention in eating disorders (Murray, 2022; Waller et al., 2012). In part, this is likely to be because surveys are not mentioned in all protocols (e.g., Fairburn, 2008). However, it is also important to consider the role of the therapists' inability to tolerate unpredictability in therapy for eating disorders, leading to reluctance to employ methods based around behaviour change (Turner et al., 2014).

To summarise, surveys are recommended as and when required in some evidence-based treatments for eating psychopathology, such as CBT-T (Waller et al., 2019), but there is limited research on their effectiveness (Murray et al., 2022). Therefore, it is clinically necessary to review the effectiveness of surveys in isolation, particularly as there is a need for interventions that target social appearance anxiety (Sabiston et al., 2014), and evaluation of focused interventions has been

encouraged (Davey et al., 2023). At this preliminary stage in the field, it is particularly important to begin by evaluating this intervention for people who display high levels of eating and body-related concerns but do not have a current clinical diagnosis, as reducing social appearance anxiety in this group might help to prevent eating disorders.

Given that, to the author's knowledge, this is the first study researching the effectiveness of body image surveys in isolation, this study will focus on the acceptability and feasibility of such an approach, as well as providing preliminary evidence on the effectiveness of surveys. A randomised controlled design will be used, with a waiting-list control condition and follow-up period, to ensure that any evidence of effectiveness is robust. Thus, this study will test the potential for further research that uses a wait-list control design to demonstrate the impact of surveys more comprehensively. As social appearance anxiety and eating psychopathology are most common in women (Kowalski et al., 2006; Qian et al., 2021), this initial study will focus on women, though other group characteristics should be considered in future (e.g., age, ethnicity).

Aims:

1. The primary aim of the current study is to investigate whether this wait-list control design is feasible for researching the effectiveness of a body image survey intervention in females at risk of eating psychopathology.
2. To investigate whether a waitlist control design is an acceptable way of researching the effectiveness of a body image survey intervention in females at risk of eating psychopathology.
3. To gather pilot evidence about the effectiveness of a survey intervention in females at risk of eating psychopathology.

Hypotheses:

1. A wait-list control design will be feasible in researching a body image survey intervention, according to pre-determined criteria (outlined in Table 1).
2. A wait-list control design will be acceptable in researching a body image survey intervention, according to pre-determined criteria (outlined in Table 1).
3. The survey intervention will result in positive changes in the outcome variables, particularly its central target of social appearance anxiety (primary outcome variable).

Method**Design**

Ethical Approval was granted by the University of Sheffield ethics committee (Appendix 1). The study was pre-registered on Open Science Framework (<https://doi.org/10.17605/OSF.IO/ZQPEU>). Participants read the information sheet (Appendix 2) and consented to the research (Appendix 3).

A wait-list control design was used to address the research aims. Participants with high levels of social appearance anxiety were randomly allocated to either group one (immediate intervention) or group two (wait list prior to intervention) (Figure 1). There was a gap of between 5-11 days between time point one and time point two, and between time point two and time point three. This was longer than the aim of 5-8 days, due to the logistics of participants completing both intervention sessions and having time to complete the questionnaires. Time point four (Follow-up) was four weeks after time point 3.

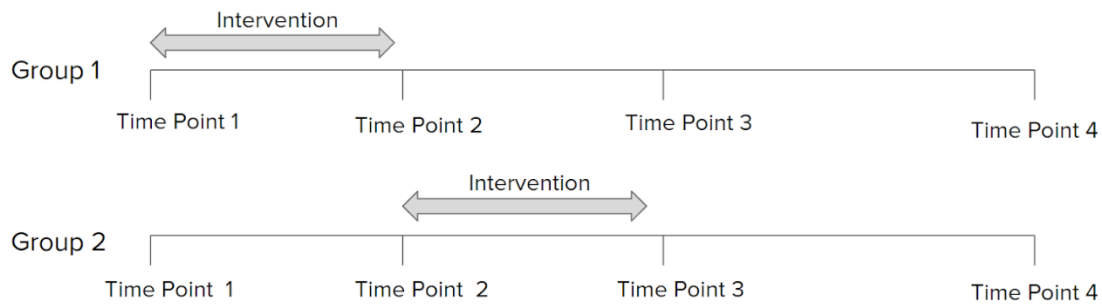


Figure 1 - Study design

Participants

Survey intervention

Participants receiving the intervention were recruited via advertisement within Sheffield University and using the Sheffield University undergraduate research participation system (SONA) (Appendix 4). Participants either received research credits or were entered into a prize draw for two £40 Amazon vouchers as an appreciation for their time. Participants were told that the study aimed to recruit people with social appearance anxiety and to complete the screening questionnaire if they did. Inclusion criteria were cisgender females over the age of 18 who scored above 40 on the Social Appearance Anxiety Scale (SAAS) in the initial screening questionnaire. While there is no established clinical cut-off for the SAAS, a score of around 30 is deemed average for the population (Levinson & Rodebaugh, 2011). Therefore, a score of 40 and above was deemed appropriate to select participants who had a higher risk of eating and body image psychopathology. Participants were excluded from the study if they had a current diagnosis of an eating disorder. People were also excluded if they were unable to speak English fluently, as the facilitator of the intervention was only able to speak English.

A CONSORT diagram is displayed in Figure 2, detailing recruitment and

progress. Seventy participants consented to the study and were assessed for eligibility using the screening questionnaire (Social Appearance Anxiety Scale). Sixteen of these participants were excluded as they did not meet inclusion criteria, seven participants declined to participate in the intervention and 11 participants did not reply to the email asking them to book intervention slots within a week. Therefore, 36 participants were randomised using the Excel randomiser to the 'active-wait' group (intervention first, $n=17$) or the 'wait-active' group (wait-list first, $n=19$). Fifteen people in 'active-wait' and 16 people in 'wait-active' received the full intervention. However, due to missing data, full data were analysed from 14 participants in each group. Demographics are displayed in the Results section.

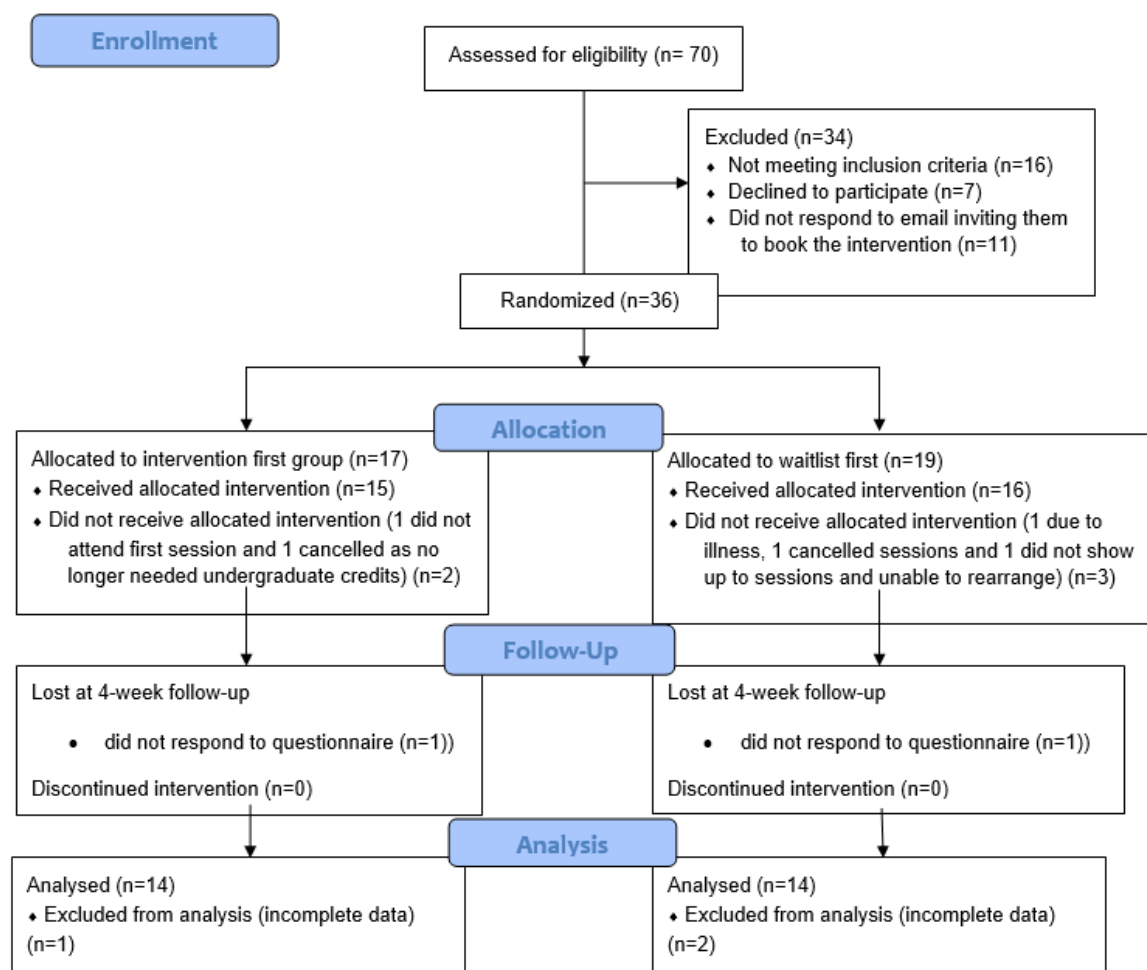


Figure 2 - Consort Diagram

Raters

Twenty females were recruited to rate the photos in the survey intervention. Raters were recruited opportunistically via personal and professional contacts of the lead researcher. They were required to be 18+ years and fluent in English. The mean age of the raters was 25.1 years ($SD = 4.45$). Seventeen of the raters were of white ethnicity, and three were of Middle Eastern ethnicity. Raters were told they were taking part in research into body image, and were not told that their ratings would be fed back to participants. Raters were instructed to look at the pictures of the participants and to answer the questions honestly. Ten raters were used for each survey, meaning each rater completed between 14-16 surveys. The same raters completed scoring of photographs of participants in both the wait-active and active-wait groups.

The Intervention

The body image surveys were conducted by the lead researcher (Trainee Clinical Psychologist) based on the CBT-T protocol (Waller et al., 2019). The intervention consisted of two 30-minute sessions, delivered virtually. The research supervisor clinically supervised this work to ensure the integrity and quality of the intervention. The full intervention protocol can be found in the Appendix 5, but a brief description of the intervention is outlined below:

Session 1

1. Complete measures (see below), using Qualtrics.
2. Get the patient to send a photo that shows their body (anonymised and wearing relatively fitted clothes).
3. Establish the participant's current beliefs about how others rate their body, based on that photo.

4. Set up the survey – consisting of five questions that will allow the belief to be tested among the reviewers (using the photo).
5. Gather the participant's predictions about what the reviewers' responses will be (and how strongly the participant rates each belief).

Between sessions

6. Send the photo and survey to the reviewers.
7. Gather data on what other people believe in response to the survey questions from 10 raters using Qualtrics.
8. Raters received a £10 Amazon voucher once they had completed 15 surveys, in appreciation of their time.

Session 2

9. Feed the results from the survey back to the participant.
10. Compare the results to the person's predictions.
11. Revisit the beliefs regarding what others think about their body and draw conclusions from completing the survey.
12. Complete measures.

Measures

At each time point, participants were asked to complete well-validated measures of social appearance anxiety, body image concerns, general psychological distress, and eating psychopathology. Questionnaires (Appendix 6) that were administered at each time point are represented in Figure 3.

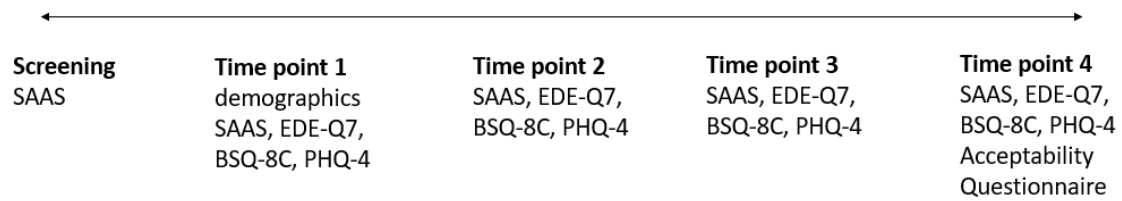


Figure 3 - Measures Administered at Each Time Point

Qualtrics was used for participants to answer the following questionnaires:

Demographic Questionnaire

Demographic data were collected, including age, gender, ethnicity, weight and height.

Social Appearance Anxiety Scale (SAAS; Hart et al., 2008).

The SAAS is a 16-item self-report measure, assessing anxiety that people experience when they perceive that others could be negatively evaluating their overall appearance. Each item is rated on a five-point Likert type scale (1 not at all; 5 extremely), with higher scores indicating greater social appearance anxiety. Scores on the SAAS have been shown to have good internal consistency, convergent validity, and test-retest reliability (Hart et al., 2008). There are no established clinical cut-offs for the SAAS, Cronbach's alpha and McDonald's omega scores were above 0.8 for all time points in this study, indicating good internal consistency.

Eating Disorder Examination (EDE-Q7; Grilo et al., 2013)

The EDE-Q7 consists of seven items of the Eating Disorder Examination-Questionnaire (Fairburn, 2008), which is a widely used questionnaire assessing the frequency of eating disorder symptoms over the past four weeks. For this study, the questionnaire was amended to assess frequency of eating disorder symptoms over

the past week. The EDE-Q7 generates three scales (Dietary Restraint, Shape/Weight Overvaluation, Body Dissatisfaction). Items are rated on a 0–6 Likert scale, based on either frequency (e.g., “No days” to “Every day”) or degree (“Not at all” to “Extremely”), with higher scores indicating more eating psychopathology. It has good internal consistency in a UK undergraduate population, and scales of the EDE-Q7 are significantly correlated with disordered eating behaviours and measures of eating disorder-specific quality of life (Jenkins & Davey, 2020). A clinical cut-off score of 3.64 for the global score has been suggested (Bang et al., 2023). Cronbach’s alpha and McDonald’s omega scores were above 0.8 for all time points in this study, indicating good internal consistency.

Body Shape Questionnaire (BSQ-8C; Evans & Dolan, 1993).

The BSQ-8C is a short version (eight items) of the Body Shape Questionnaire (Cooper et al., 1987). It measures body satisfaction over the past four weeks, with higher scores indicating greater levels of body image dissatisfaction. For this study, the questionnaire was amended to ask participants to consider their body satisfaction over the last week. It has a good internal consistency (Kling et al., 2019) and can be used in non-clinical populations (Welch et al., 2012). In a systematic review, it is suggested that there is moderate evidence for convergent validity (Kling et al., 2019). High sensitivity to change has also been found for the BSQ-8C (Pook et al., 2008). A clinical cut-off score of 26.5 has been suggested (Veisy et al., 2018). Cronbach’s alpha and McDonald’s omega scores were above 0.8 for all time points in this study, indicating good internal consistency.

Patient Health Questionnaire-4 (PHQ-4; Kroenke et al., 2009)

The PHQ-4 is a four-item questionnaire, which combines the brief Patient Health Questionnaire-2 (PHQ-2) and Generalised Anxiety Disorder Assessment-2

(GAD-2). This creates an anxiety subscale and a depression subscale. The anxiety subscale measures the core criteria for Generalised Anxiety Disorder, which is effective at screening for social anxiety, panic and post-traumatic stress disorder (Kroenke et al., 2007). The depression subscale assesses the two core diagnostic features of depression (Kroenke et al., 2003). Questions are answered on a four-point Likert scale based on frequency (from “not at all” to “nearly every day”). Higher scores indicated more psychological distress. Although the PHQ-4 asks people to rate their psychological distress over the last two weeks, for this study, participants were asked to rate the questions based on the previous week. Scores of 3 and above for the depression subscale and/or the anxiety subscale suggest probable cases of anxiety or depression. This cut-off has good sensitivity and specificity (Löwe et al., 2010; Staples et al., 2019). The PHQ-4 has been found to measure anxiety and depression reliably and validly in the general population (Löwe et al., 2010; Staples et al., 2019), and it is sensitive to treatment changes (Staples et al., 2019). Cronbach alphas were above 0.8 for all time points in this study for the anxiety and depression subscales, indicating good internal consistency.

Acceptability of the survey intervention

Participants were asked whether they would complete the intervention again if offered the opportunity, using a seven-point Likert scale (1 = totally unwilling; 7 = would be happy to).

Data Analysis

To analyse acceptability and feasibility (hypotheses 1 and 2), performance was monitored against the pre-defined stop-go criteria provided in Table 1.

SPSS (version 29) was used to analyse the questionnaire data (hypothesis 3). A set of 2 x 4 repeated measures ANOVAs were used to compare outcomes

between groups across the four time points (repeated measure). Given that ANOVAs can cope robustly with skewness and kurtosis (Box et al., 1978), this was deemed an appropriate analysis. Mauchley's test of sphericity was calculated, and if this was significant, the Greenhouse-Geisser correction was used. Normality statistics can be found in the appendix (Appendix 7). One-tailed p values were used, given the directional hypothesis (hypothesis 3). Effect sizes were reported as partial η^2 , where a score of ≥ 0.14 indicates a large effect, 0.06 - 0.13 indicates a medium effect, and 0.01 - 0.05 indicates a small effect (Cohen, 1992). Independent sample t-tests were used to interpret the interaction of time by group, reporting Cohen's d as the effect size.

Cronbach alpha and McDonald's omega (where there were more than two items in the scale) were calculated at each time point, to ensure internal consistency of the scales.

Table 1 - Pre-determined Criteria for Acceptability and Feasibility

		Red (stop)	Amber (consider amending)	Green (go)
Feasibility	Number of participants expressing interest (completing screening questionnaire)	<30	30-59	60+
	Percentage of participants who consent to the intervention when offered it	<50%	50-75%	>75%
	Number of participants recruited to complete the intervention	<20	20-29	30+
Acceptability	Percentage of participants who complete the whole study	<50%	50-75%	>75%

(including follow-up measures)			
Average score on participants' willingness to do the intervention again	<3	3-5	>5

Results

Feasibility and Acceptability (Aims 1 and 2)

In the context of this method of recruitment with incentives (university undergraduate credits or being entered into a prize draw), all the feasibility criteria were met (see Figure 1). Seventy potential participants expressed interest in the study, which was higher than the target of 60 (Table 1). Of those who were eligible, 36 out of 43 (83.72%) consented to take part in the intervention when offered, which was higher than the target of 30 (Table 1).

All the acceptability criteria were met (see Figure 1). Twenty-eight participants (77.8%) completed the whole study, including follow-up measures, which was higher than the 75% target (Table 1). The average acceptability score was 5.72, which was higher than the target of 5.0 (Table 1).

Sample characteristics

Table 2 shows the characteristics of the completing participants in the two groups. The randomisation was generally effective. Although the mean age of the wait-active group (wait-list control) was higher than that of the other group, this was not significant.

Table 2 - Demographics

	Active-Wait (n=14)	Wait-Active (n=14)	t or χ^2	P value
Age mean (SD)	21.07 (4.81)	23.79 (9.06)	-0.99	.331
	Range (18-36)	Range (18-48)		
Ethnicity	9 White	10 White	3.719	.293
	2 Asian	4 Asian		
	2 Mixed Ethnicity			
	1 Middle eastern			
BMI mean (SD)	23.84 (5.27)	23.61 (6.16)	0.102	.919
	(Range=17.4-36.8)	(Range= 17.7 -35.2)		

Preliminary effectiveness of the survey intervention (Aim 3)

Table 3 displays means and standard deviations for all the measures for the wait-active group and for the active-wait group across time. SAAS, EDEQ-7 global, EDEQ-7 Drive for Thinness (DT), EDEQ-7 Shape and Weight Over-evaluation (SWO), EDEQ-7 Body dissatisfaction (BD), and BSQ-8c mean scores all reduced in both groups across time. Table 4 shows the results of 2 (Group) x 4 (Time) repeated measures ANOVAs for each outcome variable. 'Group' (between subject) compared the active-wait and wait active groups, while 'Time' (within subject) compared scores within groups across the four time points (*Active-wait group* = Immediately pre-intervention; Immediately post-intervention; One week post-intervention; Five weeks post-intervention: *Wait-active group* = Beginning of one week pre-intervention; Immediately pre-intervention; Immediately post-intervention; Four weeks post-intervention). The interaction term tested group differences related to the stage in intervention, thus controlling for time point across groups.

Main effects

The ANOVAs showed significant main effects of Time for social appearance

anxiety, eating psychopathology and body image, where scores improved with very large effect sizes. However, there were no significant effects of Group for any variable apart from PHQ depression, where the waiting list group scored higher than the initially active group throughout (Table 4).

Group x time interactions

Finally, there were three significant interactions of Group x Time. Social appearance anxiety had a very large effect size. The only significant difference between groups on the SAAS ($t = 4.706$, $P < .001$, $d = -1.749$) was at time point 2, when the active-wait group had received the intervention and the wait-active group had not. The effect size of the difference was very large. Figure 4 displays this interaction.

The interaction effects were moderate for the measures of body image (BSQ-8c [Figure 5] and EDEQ-7 BD sub-scale [Figure 6]). However, there were no significant differences between groups at the different time points in the post hoc t-tests (BSQ-8c time point 2 - $t = 1.05$, $P = .151$, $d = -0.392$; EDEQ-7 BD subscale time point 2 - $t = 1.416$, $P = .081$, $d = -0.535$). Graphs for the other interaction effects can be found in Appendix 8.

Table 3 - Means and standard deviations on each measure across the four time points

		Time Point 1	Time Point 2	Time Point 3	Time Point 4
SAAS	Active-Wait	56 (8.88)	43.5 (7.49)	45.57 (8.92)	43.07 (8.39)
	Wait-Active	58.29 (10.16)	59.43 (10.08)	43.64 (11.02)	44.29 (14.20)
EDEQ-7 global	Active-Wait	3.5 (1.13)	2.92 (1.30)	2.87 (1.39)	2.54 (1.19)
	Wait-Active	3.83 (1.44)	3.51 (1.52)	2.66 (1.57)	2.44 (1.73)
EDEQ-7 DT	Active-Wait	2.36 (1.71)	2.02 (1.76)	2.17 (2.13)	1.40 (1.18)
	Wait-Active	2.74 (1.96)	2.64 (2.01)	2.36 (1.94)	2.0 (2.22)
EDEQ-7 SWO	Active-Wait	4.36 (1.12)	3.64 (1.33)	2.54 (1.45)	3.43 (1.49)
	Wait-Active	4.61 (1.34)	4.00 (1.47)	2.71 (1.24)	2.54 (1.93)
EDEQ-7 BD	Active-Wait	4.36 (1.18)	3.53 (1.31)	3.46 (1.31)	3.36 (1.38)
	Wait-Active	4.68 (1.41)	4.32 (1.61)	2.96 (1.78)	3.00 (1.63)
BSQ-8c	Active-Wait	30.14 (9.26)	25.71 (8.75)	25.29 (8.01)	24.79 (8.32)
	Wait-Active	30.0 (10.06)	28.71 (8.88)	25.43 (8.61)	21.14 (9.93)
PHQ-4 Anxiety	Active-Wait	3.43 (1.79)	2.57 (1.34)	2.14 (1.46)	2.43 (1.65)
	Wait-Active	2.64 (1.65)	2.53 (1.55)	2.71 (2.09)	2.57 (2.21)
PHQ-4 Depression	Active-Wait	1.57 (1.34)	1.29 (0.83)	0.79 (0.70)	1.43 (1.40)
	Wait-Active	2.50 (1.61)	2.13 (1.96)	2.29 (2.27)	2.36 (2.21)

SAAS – social appearance anxiety scale, EDEQ-7 – Eating Disorder Examination Questionnaire -7 (DT – drive for thinness,

SWO- Shape and weight overevaluation, BD- body dissatisfaction), BSQ-8c – Body Shape Questionnaire – 8c, PHQ-4 –

Patient Health Questionnaire 4.

Table 4 - Repeated Measures ANOVAs

	Time			Group			Time x Group Interaction		
	<i>F</i>	<i>P</i>	<i>Partial eta</i> ²	<i>F</i>	<i>P</i>	<i>Partial eta</i> ²	<i>F</i>	<i>P</i>	<i>Partial eta</i> ²
SAAS	33.790	<.001	0.565	1.744	.198	0.063	13.790	<.001	0.337
EDEQ-7	15.214	<.001	0.369	0.99	.755	0.004	1.982	.071	0.071
global									
EDEQ-7 DT	4.164	.005	0.138	0.477	.496	0.018	0.325	.807	0.012
EDEQ-SWO	18.218	<.001	0.412	0.004	.951	0.000	2.204	.054	0.078
EDEQ-BD	14.406	<.001	0.347	0.018	.985	0.001	3.174	.02	0.109
BSQ	16.088	<.001	0.382	0.003	.960	0.001	3.304	.013	0.113
PHQ Anxiety	1.840	.074	0.066	0.009	.462	0.001	1.879	.07	0.067
PHQ	1.045	.189	0.039	4.516	.043	0.148	.498	.308	0.019
Depression									

SAAS – social appearance anxiety scale, EDEQ-7 – Eating Disorder Examination Questionnaire -7 (DT – drive for thinness, SWO- Shape and weight overevaluation, BD- body dissatisfaction), BSQ-8c – Body Shape Questionnaire – 8c, PHQ-4 – Patient Health Questionnaire 4.

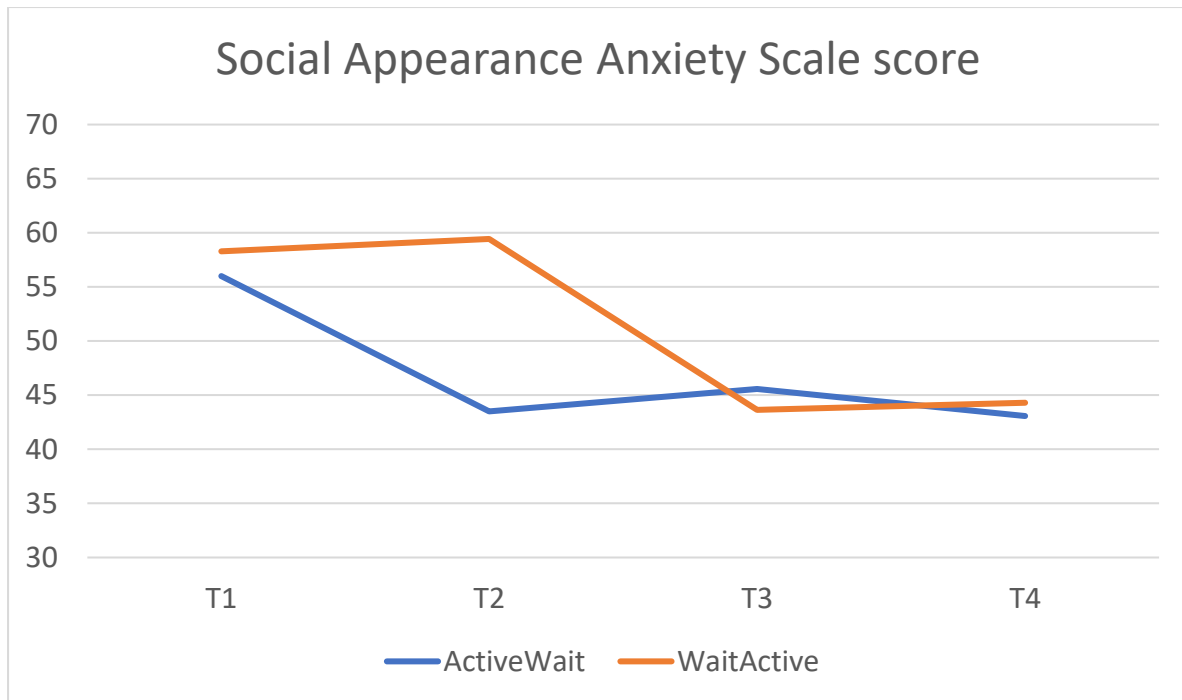


Figure 4 - Social Appearance Anxiety - Time and Group Interaction

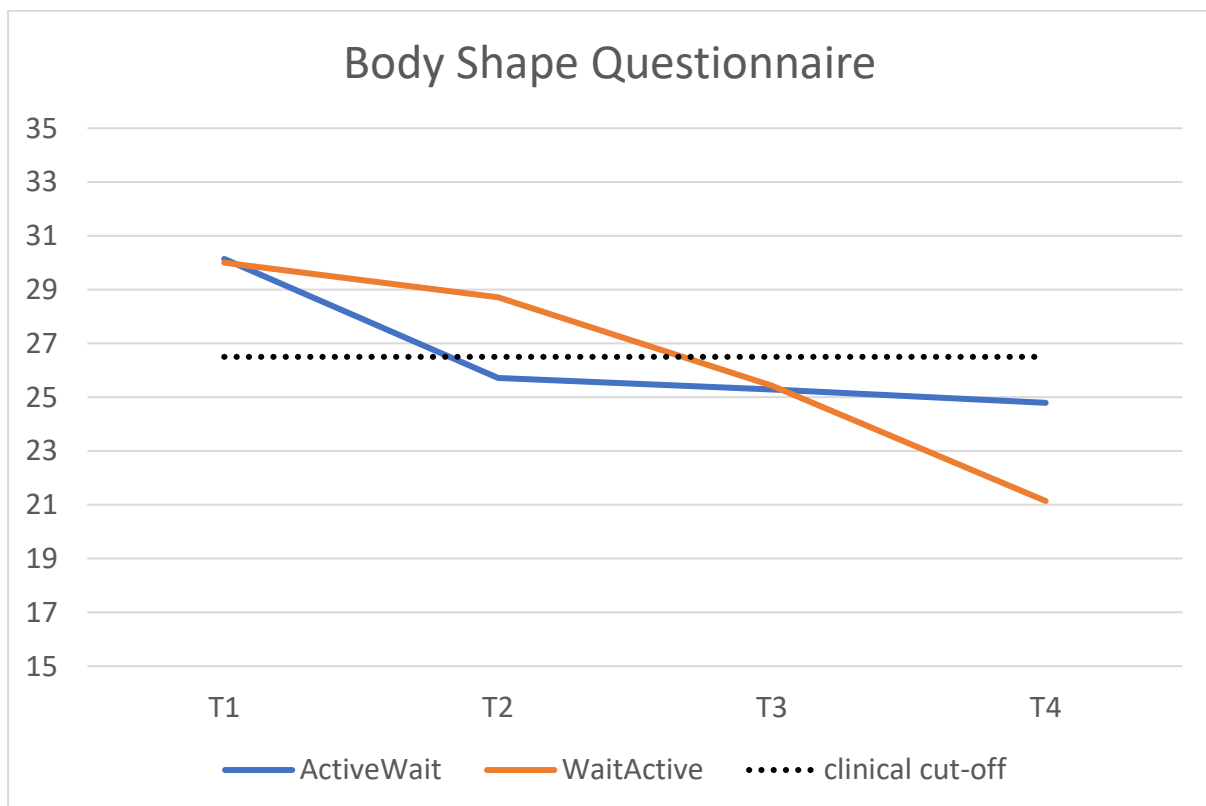


Figure 5 – Body Shape Questionnaire - Time and Group Interaction

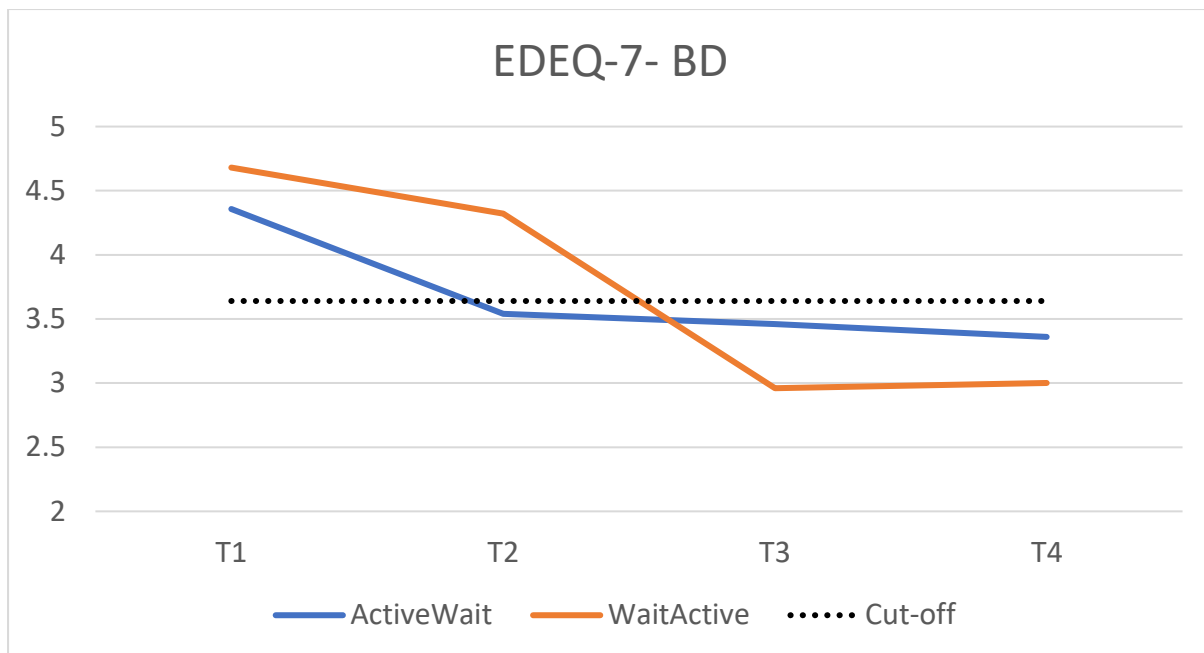


Figure 6 – EDEQ-7 Body Dissatisfaction - Time and Group Interaction

Discussion

To the author's knowledge, this is the first study researching the effectiveness of body image surveys in isolation. Therefore, the aim was to investigate whether this wait-list control design is a feasible and acceptable way for researching the effectiveness of a body image survey intervention in females at risk of eating psychopathology. The study also gathered pilot evidence about the effectiveness of a survey intervention in females at risk of eating psychopathology.

Findings support the feasibility and acceptability of the use of surveys in this way, supporting hypotheses 1 and 2. Hypothesis 3 was partially supported. The survey intervention was effective in significantly reducing social appearance anxiety – the primary outcome variable - with a very large effect size. The survey intervention also demonstrated medium effect sizes in reducing body image distress and body dissatisfaction, but at post-hoc testing the differences at time point two (when the active-wait group had had the intervention and the wait-active group had

not had it) did not reach significance. Additionally, although there were significant reductions over time in mean scores for global eating psychopathology, drive for thinness and weight and shape overevaluation, no significant time and group interaction was found. The survey intervention was not effective at reducing depression and anxiety.

Relationship of findings to the wider literature

Social anxiety and eating psychopathology are highly comorbid (Levinson & Rodebaugh, 2012; Kerr-Gaffney et al., 2018). Social appearance anxiety and fear of negative evaluation are vulnerabilities for both social anxiety and eating disorder symptoms (Levinson & Rodebaugh, 2012), with social anxiety and eating psychopathology comorbidity being linked with a more severe illness (Kerr-Gaffney et al., 2018). Fear of negative evaluation seems to be a transdiagnostic feature of developing and maintaining an eating disorder (Trompeter et al., 2019), as it is related to the majority of risk factors in eating psychopathology (DeBoer et al., 2013; Utschig, 2010). Given this close link, Utschig et al. (2013) found that adding fear of negative evaluation improved the original dual-pathway model for BN (Stice, Shaw & Nemeroff, 1998). It is, therefore, important to address fear of negative evaluation in body image and eating disorder interventions (DeBoer et al., 2013; Trompeter et al., 2019).

This study adds to the evidence about how body image distress can be treated. A meta-analytic review suggests that most brief stand-alone interventions for body image lead to small-medium effect sizes (Alleva et al., 2015). However, studies using stand-alone behavioural experiments were not identified in that review or in more recent papers that use interventions such as acceptance and commitment therapy (Li et al., 2025; Mirzaei et al., 2023; Srichan et al., 2023), CBT (Dogaheh et

al., 2011; Mirzaei et al., 2023) or psychoeducation (Ghosh et al., 2023) for the fear of negative evaluation. In short, there is insufficient research into focused interventions for fear of negative evaluation.

Considering that gap in our understanding, it is important to consider that behavioural experiments are among the most powerful stand-alone change methods (Bennett-Levy et al., 2004), leading to more behavioural and belief change than thought records (Bennett-Levy, 2003). Therefore, it is consistent that, in this study, body image surveys should have produced very large reductions in social appearance anxiety and tended to show medium reductions in body image measures.

Research implications and limitations

Whilst this study has strengths, such as using a randomised controlled design and considering multiple outcomes of survey interventions, it had a relatively small sample size, limiting power at post hoc testing. Therefore, as this design met pre-determined acceptability and feasibility criteria, a full trial with adequate power is needed to fully evaluate the intervention (Skivington et al., 2021). Such a full trial should strive to regularise gaps between the administration of measures.

Furthermore, such research should establish the effectiveness of body image surveys in other populations such as men and gender non-conforming individuals, given that the role of social appearance anxiety in the development of eating psychopathology and other mental health conditions might differ across gender identities (Haase et al., 2002; Klemmer et al., 2021; Li et al., 2024; Turel et al., 2018).

It is also important to acknowledge that this study may have been influenced by demand characteristics and priming effects, as the advertisement for the study

stated the intervention was designed to improve body image. By explicitly stating the intended purpose of the intervention, participants may have been biased to respond in a manner consistent with these expectations, thereby potentially inflating the observed effects. Future research could consider employing more neutral descriptions of the intervention to minimize these risks.

Of course, validation of these findings in clinical groups is necessary, in keeping with the need for evaluation of focused interventions for different presentations of eating disorders (Davey et al., 2022). Future research should also compare outcomes among individuals with different weight/BMI status. In all such groups, it would also be helpful to evaluate the effectiveness of different types of surveys (e.g., interpersonal and intrapersonal; body judgement vs stigma-based) and repeated surveys (Murray et al., 2022; Waller et al., 2019). It would also be helpful to assess the body image of raters, in order to see whether it impacts the ratings given, and hence the overall results.

To further extend these findings, future research should consider component analysis of CBT-ED to clarify the active ingredients driving change, informing the refinement and optimization of interventions (Bell et al., 2013). Implementation research will also be important, as recommended by the framework for developing and evaluating complex interventions (Skivington et al., 2021). Further research will also be needed in non-western cultures, as it is important to acknowledge that the efficacy of this intervention might be different in cultures that do not have the prevalent western thin ideal.

Clinical implications

Surveys are rarely used by therapists in treating eating disorders (Waller et al., 2012), possibly because they are not mentioned in all CBT-ED protocols (e.g.,

Fairburn, 2008), and possibly due to therapist anxiety about pushing the patient too hard (Waller et al., 2012). Therapists might over-estimate the stress that a body image survey could cause (e.g., unhelpful responses) and underestimate the client's ability to cope (Murray et al., 2022; Waller, 2009). However, given that social appearance anxiety is a common maintaining factor in eating psychopathology (Alcaraz-Ibáñez et al., 2023; Kowalski et al., 2006; Lanfranchi, 2015; Sabiston et al., 2014) and this study has found individuals found surveys to be highly acceptable and effective at reducing social appearance anxiety, clinicians and supervisors should consider the use of body image surveys in interventions for body image and eating psychopathology.

Body image surveys could also be a helpful preventative intervention for eating psychopathology, given that fear of negative evaluation is considered an important target in prevention programs (DeBoer et al., 2013) and social appearance anxiety is considered a vulnerability factor for eating psychopathology (Alcaraz-Ibáñez et al., 2023). Such a preventative approach is particularly important, given the importance of early intervention in eating psychopathology to promote full-recovery (Schmidt et al., 2016; Treasure et al., 2020).

Finally, as social appearance anxiety is common in the general population (Kowalski et al., 2006; Sabiston et al., 2014), body image surveys should also be considered as a possible tool to promote positive body image in the non-clinical population. A single-session intervention approach may be helpful (e.g., Schleider & Beidas, 2022; Schleider & Weisz, 2017), enhancing the cost-effectiveness and scalability of this effective intervention.

Summary

To the author's knowledge, this is the first study researching the effectiveness of body image surveys for social appearance anxiety. The wait-list randomized controlled design was feasible and acceptable for this research. Pilot evidence suggests that body image surveys are potentially effective at reducing social appearance anxiety and body image distress. While a full trial is needed to add to this evidence (using the effect sizes demonstrated here to plan sample size), body image surveys appear to be an acceptable and beneficial treatment for people with high levels of social appearance anxiety.

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Appendices

Appendix 1: Ethical Approval



Downloaded: 23/01/2024
Approved: 23/01/2024

Emma Giles
Registration number: 220237929
Psychology
Programme: Doctorate in Clinical Psychology

Dear Emma

PROJECT TITLE: An Acceptability and Feasibility Study of a Waitlist Control Design to Evaluate the Effectiveness of Body Image Surveys on Social Appearance Anxiety in Females at Risk of Eating Psychopathology
APPLICATION: Reference Number 057860

On behalf of the University ethics reviewers who reviewed your project, I am pleased to inform you that on 23/01/2024 the above-named project was **approved** on ethics grounds, on the basis that you will adhere to the following documentation that you submitted for ethics review:

- University research ethics application form 057860 (form submission date: 19/01/2024); (expected project end date: 30/05/2025).
- Participant information sheet 1131692 version 3 (19/01/2024).
- Participant consent form 1131230 version 1 (05/12/2023).

If during the course of the project you need to [deviate significantly from the above-approved documentation](#) please inform me since written approval will be required.

Your responsibilities in delivering this research project are set out at the end of this letter.

Yours sincerely

Department Of Psychology Research Ethics Committee
Ethics Administrator
Psychology

Please note the following responsibilities of the researcher in delivering the research project:

- The project must abide by the University's Research Ethics Policy: <https://www.sheffield.ac.uk/research-services/ethics-integrity/policy>
- The project must abide by the University's Good Research & Innovation Practices Policy: https://www.sheffield.ac.uk/polopoly_fs/1.6710661/file/GRIIPPolicy.pdf
- The researcher must inform their supervisor (in the case of a student) or Ethics Administrator (in the case of a member of staff) of any significant changes to the project or the approved documentation.
- The researcher must comply with the requirements of the law and relevant guidelines relating to security and confidentiality of personal data.
- The researcher is responsible for effectively managing the data collected both during and after the end of the project in line with best practice, and any relevant legislative, regulatory or contractual requirements.

Appendix 2: Information Sheet

Participant Information Sheet

A study investigating the effectiveness of a body image survey intervention for social appearance anxiety

You are being invited to take part in a research project. Before you decide whether or not to participate, it is important for you to understand why the research is being done and what it will involve. Please take time to read the following information carefully and discuss it with others if you wish. Ask us if there is anything that is not clear or if you would like more information. Take time to decide whether or not you wish to take part.

This study is researching the effectiveness of a body image survey intervention for social appearance anxiety. Social appearance anxiety is type of anxiety people experience when they worry that other people are judging their appearance negatively in social situations. It is clinically important to conduct research evaluating interventions to reduce social appearance anxiety.

Who can take part?

To be included in the study we are looking for people who meet the following criteria:

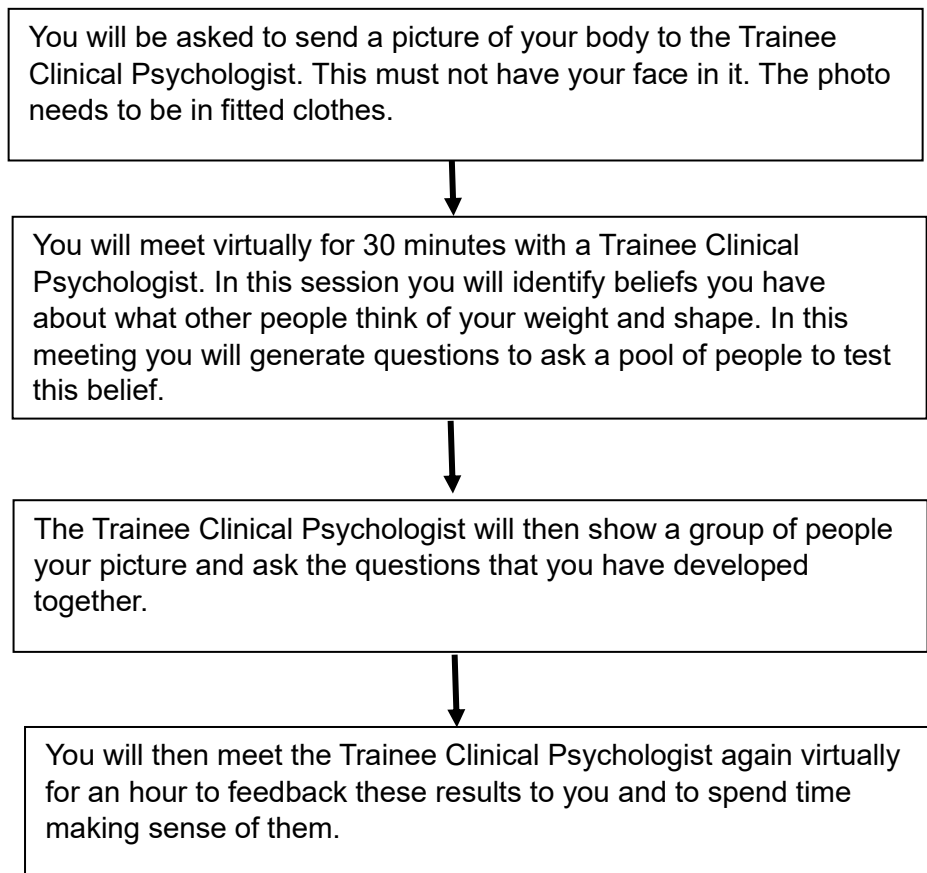
- Aged 18 or over
- Cisgender females
- Able speak English.
- Experience worry/anxiety that other people are judging your weight and shape negatively in social situations.
- Do not have a current diagnosis of an eating disorder and/or are not in current treatment for an eating disorder.

What does the study involve?

1. You will be asked to complete a questionnaire about the anxiety that you experience around your weight and shape. You will be asked to give your email at the end of this process so that the researcher can contact you.
2. You will then be contacted by the researcher to let you know if you have been selected to take part in the study and to receive the intervention.
3. If selected you will be allocated to either group 1 or group 2. Group 1 will receive the intervention straight away and group 2 will wait around a week to receive the intervention.
4. ***You will asked to complete questionnaires that take roughly 15-20 minutes every week for 3 weeks. You will then be asked to complete the questionnaires again 4 weeks later.***
5. Participants who were selected for and completed the intervention will be entered into a prize draw for a £40 amazon gift voucher to thank them for taking part.

What is a Body Image Survey Intervention?

- Survey interventions are frequently used to support people with social anxiety and body image distress. A body image survey involves testing out distressing beliefs that a person has about what other people think about their body.
- To complete this intervention it will require you to attend two virtual 30 minute meetings with the lead researcher, who is a Trainee Clinical Psychologist. There will be one week between each session. Below is a flow chart of what the intervention involves.

**Who has ethically reviewed the project?**

This project has been approved by the University of Sheffield ethical review board. This means that it has been agreed that the project is safe to be conducted.

What are the possible advantages of taking part?

An advantage to taking part is that, if selected, you will be receiving an intervention that will support you to have a more realistic idea of what other people are thinking. It is hoped that this will improve your body image. Through doing this intervention you will also learn the skills to continue to administer this type of intervention for yourself. Another advantage of taking part is that you will be helping clinicians and researchers develop more of an understanding of the effectiveness of body image surveys. This is important given the high levels of body dissatisfaction in the population.

What are the possible disadvantages of taking part?

If selected for the intervention, it may be anxiety provoking for you. Additionally, during the study you will be asked to complete questionnaires that ask you to consider your body image and eating behaviours, which may be distressing. We will ensure you are aware of places where you can get further support.

What will happen to my information?

Your participation in this study is voluntary and you have the right to withdraw from the study at any time without giving a reason. You may also request to withdraw your data from the study up to two weeks after completing the final measures.

Any personal information you provide, such as your email address will be kept safe and secure and will only be accessed by the researcher. The photograph of your body and the survey results will be emailed to you following the intervention and then permanently deleted by the researcher. Your personal information, such as your email address, will be permanently deleted two weeks following the last questionnaire.

The results of the study will be written up and submitted as a doctoral thesis as part of the Clinical Psychology Doctorate (DClinPsy) at the University of Sheffield. Additionally, the study will be submitted for publication in a scientific journal. Information regarding individual participants will not be included and you will not be identifiable from any reports or publications of the study.

The University of Sheffield will act as the Data Controller for this study. This means that the University is responsible for looking after your information and using it properly.

In order to collect and use your personal information as part of this research project, we must have a basis in law to do so. The basis that we are using is that the research is 'a task in the public interest'.

What if I wish to complain about the way the study has been carried out?

If you would like to make a complaint about this project, in the first instance you should contact the lead researcher (egiles2@sheffield.ac.uk). If you do not feel satisfied that your complaint has been dealt with appropriately you can contact the lead researcher's supervisor (g.waller@sheffield.ac.uk). If you feel that your complaint has not been handled to your satisfaction following this, you can contact the Department of Ethics Subcommittee on psy-ethics@sheffield.ac.uk or the head of department Dr Chris Martin (psy-hod@sheffield.ac.uk).

Appendix 3: Consent Form**A study investigating the effectiveness of a body image survey intervention for social appearance anxiety****Consent Form**

<i>Please tick the appropriate boxes</i>	Yes	No
Taking Part in the Project		
I have read and understood the project information sheet	☐	☐
I have been given the opportunity to ask questions about the project.	☐	☐
I understand that taking part in the project will include completing questionnaires about body image.	☐	☐
I understand that, if selected, I will be invited to attend 2 virtual meetings to complete the body image survey intervention.		
I understand that my taking part is voluntary and that I can withdraw from the study at any time up to 2 weeks after you complete the last set of questionnaires. I do not have to give any reasons for why I no longer want to take part and there will be no adverse consequences if I choose to withdraw.	☐	☐
How my information will be used during and after the project		
I understand my personal details such as name, phone number, address and email address etc. will not be revealed to people outside the project.	☐	☐
I understand and agree that other authorised researchers will have access to this data only if they agree to preserve the confidentiality of the information as requested in this form.	☐	☐
I understand and agree that other authorised researchers may use my data in publications, reports, web pages, and other research outputs, only if they agree to preserve the confidentiality of the information as requested in this form.	☐	☐
I give permission for the questionnaire data that I provide to be deposited in the University of Sheffield Data Repository so it can be used for future research and learning.	☐	☐
So that the information you provide can be used legally by the researchers		
I agree to assign the copyright I hold in any materials generated as part of this project to The University of Sheffield.	☐	☐

Appendix 4: Advertisement

myAnnouncement

Subject: Study of an intervention for body image concerns

Dear all,

Do you ever worry what other people might be thinking about your appearance? Does that affect your body image?

As part of my Clinical Psychology Doctorate, I am examining the effectiveness of an intervention to reduce the body image concerns that people experience when they worry that other people are negatively judging their appearance. The study has been approved by the University of Sheffield School of Psychology Research Ethics Committee.

If you are female, aged 18 or over, and experience anxiety that other people are negatively judging your appearance, then I would appreciate it if you would consider taking part in this research. To find out more about the study and to decide if you would like to take part in the initial brief screening stage, please click this link: https://shef.qualtrics.com/jfe/form/SV_0H4qmpx4HnSGa1g

If you have any questions regarding the research, please email; egiles2@sheffield.ac.uk

Thank you for your time and consideration.

Emma Giles

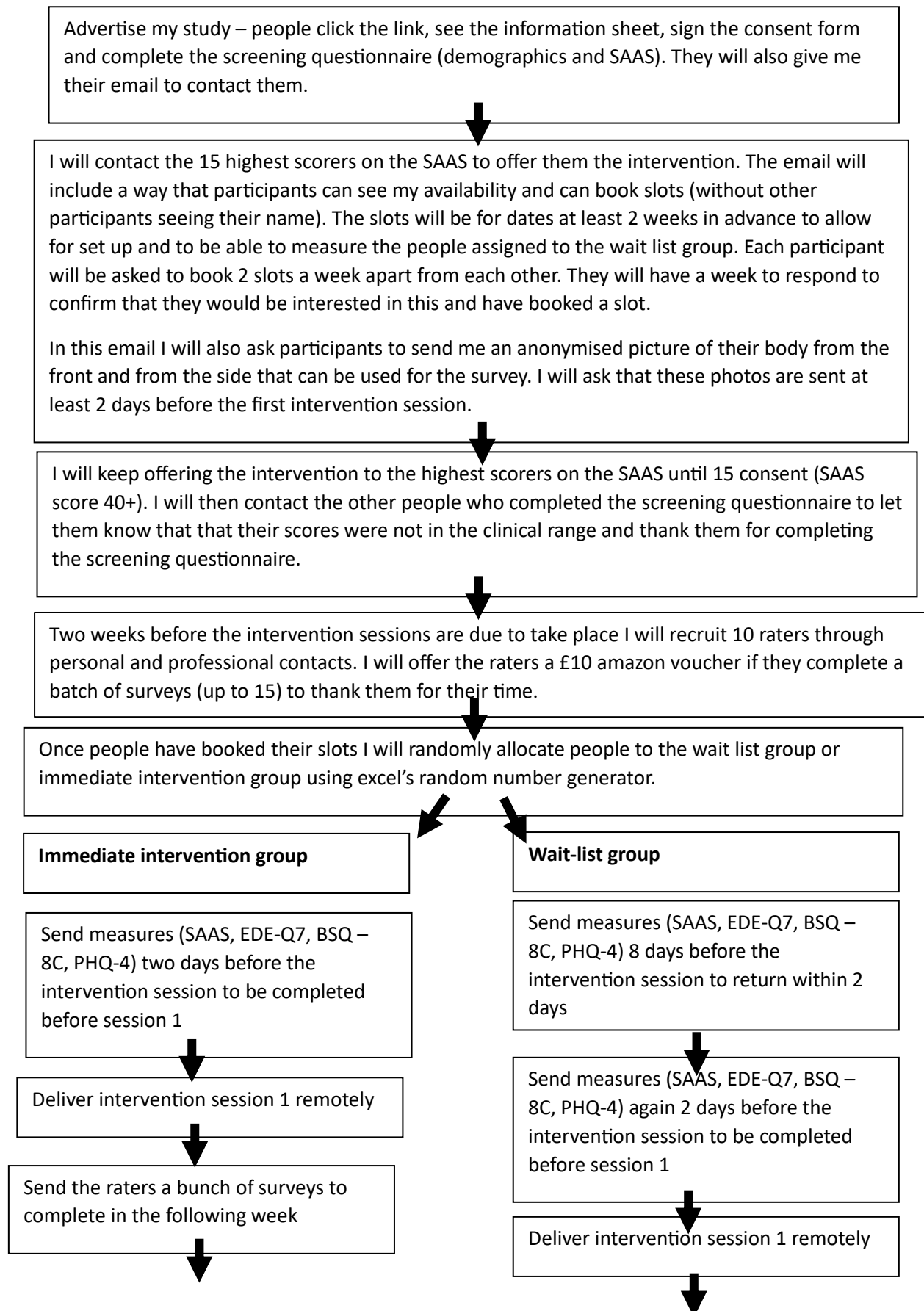
Trainee Clinical Psychologist

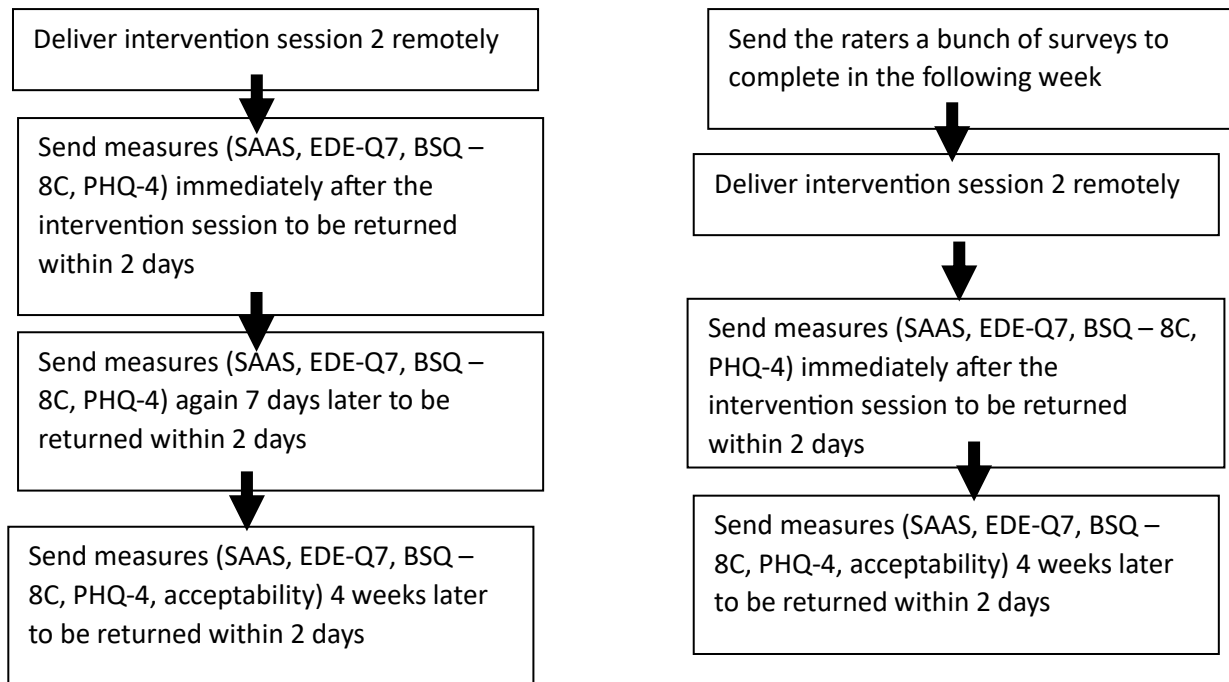
School of Psychology

University of Sheffield

SONA

Abstract	This study is examining the effectiveness of an intervention to reduce the body image concerns that people experience when they worry that other people are negatively judging their appearance.
Description	Do you ever worry what other people might be thinking about your appearance? Does that affect your body image? As part of my Clinical Psychology Doctorate, I am examining the effectiveness of an intervention to reduce the body image concerns that people experience when they worry that other people are negatively judging their appearance. The study has been approved by the University of Sheffield School of Psychology Research Ethics Committee. To find out more about the study and to decide if you would like to take part in the initial brief screening stage, please click this link: https://shef.qualtrics.com/jfe/form/SV_0H4qmpx4HnSGa1g?id=%SURVEY_CODE% If you are selected to take part in the intervention, you will be invited to the second part of the study. The second part of the study is worth 8 credits. If you have any questions regarding the research, please email; egiles2@sheffield.ac.uk
Eligibility Requirements	To be eligible you must be female, aged 18 or over and experience anxiety that other people are negatively judging your appearance.

Appendix 5: Intervention Protocol**Intervention protocol**



The intervention

The body image surveys will be conducted by the lead researcher (Trainee Clinical Psychologist) based on the CBT-T protocol (Waller et al., 2019). The intervention will consist of two 30-minute sessions, delivered virtually. Professor Glenn Waller will clinically supervise this work to ensure integrity and quality of the intervention. Participants will be asked to send an anonymized photograph of their body before the first session (that they feel represents a key issue in their body image e.g. size, disproportionate parts, unattractive aspects). The session plans are outlined below:

Session 1 - throughout the first session I will take a Socratic approach – assuming that patients might be right before seeking evidence to challenge that belief – so that the patient doesn't feel their belief is being discounted

13. Introduce myself and the purpose of the session – “I am Emma, a trainee psychologist from Sheffield. Thank you for consenting to participate in this research and thank you for sending me the photo. Today we have 30 minutes together to develop the survey, which will involve thinking about what beliefs we want to test and what questions we can ask to test these beliefs. After we have done this, I will then collect responses to the questions we develop from around 10 women who are neutral and who will think they are taking part in some research about perceptions of female bodies. This is to ensure that the responses you get are honest. We will then meet again next week for me to feed these results back to you. Does that sound okay? Have you got any questions?”

14. Establish current beliefs about what other people think about their bodies - *"When I show people this photo what do you fear people will think? What do you worry other people think about your body?"*
15. Set up a questionnaire of 5 questions that will allow the belief to be tested. The first question we will ask in the all the surveys will be "what are the three first things you noticed about this picture?" We will aim for all other questions to be dimensional e.g. On a scale of 1 to 10....., how....*"So let's write down some questions that you could ask to find out if you are right or wrong. How about...."*
16. We will then start to consider what the participant predicts the responses will be to each question (e.g. average score will be 8) *"Okay I have written down those questions, based on this photo. So what do you think people will say when I ask them? What percentage of people do you think will say that? What do you think the average score will be? Etc"*
17. Conclude the session *"Okay... so I will go and gather responses to the questions we have developed and then I will meet you next week to feed back the results. In the meantime, if you need support then I recommend the BEAT website or if you feel that further counselling would be helpful, you can self-refer to IAPT or to the University Health Service."*

Between sessions

18. Gather the data on what other people believe from raters who I have recruited 2 weeks before the intervention. Each survey will take around 5 minutes to complete and I will ask people to do about 10-15 surveys at a time. Raters will be given a £10 amazon voucher to thank them for their time.

Session 2

19. Introduction to the session *"Hello – it's nice to see you again. So last session we developed some questions and you made some predictions of what you thought people would say. We have 30 minutes today to go through the responses together."*
20. Go over the predictions before the feedback *"you predicted that.... so shall we see if you were right?"*
21. Feedback the responses one by one *"So for the first question the first rater said.... "*
22. I will share my screen so that the participant can see the word document and I will add the responses one by one.

Question	My prediction (what I think people will say)	Responses to survey
		1.

		2.
		3.

23. Compare the results to the patient's ratings. *"So... you predicted that.... However..... what do you conclude from that?"*
24. Summarise and reflect on the session. *"Can you summarise the results overall and how they contrast with the predictions you made? What do you make of that? What does that say about your beliefs about what other think about your appearance?"*
25. Ending the session *"I will email you a copy of this table so that you have got the results. This is a technique that you can continue to use to test beliefs, if you wish. Thank you for completing the intervention – it has been good to meet with you. Following this session, I will send you a link to some questionnaires, and then I will send you a similar link in 4 weeks – it is really important that you complete these questionnaires so that we can evaluate the intervention. If you need any further support I recommend the BEAT website, or if you feel that further counselling would be helpful, you can self-refer to IAPT."*

Troubleshooting

- If overweight and asking questions – focus on stigma if that is what worries the individual e.g. "if people think you are overweight then what...? What would people think?"
- If there are individual negative comments or scores, I will encourage the person to focus on the global set of comments/scores and how these do or do not support the original belief.
- If risk is disclosed, I will signpost participants to appropriate services, such as their GP and Samaritans. If eating disorder or mood concerns are raised, I will give the participant information about the student counselling/mental health services.
- If a person says they are ill or cancels session:
 - If this is the second session, I will allow 2 days flexibility before their data will be excluded.
 - If this is the first session and they have completed no measures I will allow them to reschedule – this may need to be in the next round of intervention sessions that I offer.
 - If this is the first session and they have completed wait list measures I will allow 2 days flexibility.
- If a person doesn't send appropriate pictures (e.g. in baggy clothes or not suitably anonymous), I will reply back to the email to say the photo does not fit the requirements (e.g. raters would be unable to see your body clearly to respond to questions, or raters may be able to identify you) and ask the participant to send another picture that fits the requirements.

Appendix 6: Questionnaires

Demographic Information

How old are you? _____

How would you describe your gender _____

How would you describe your ethnicity? _____

What is your weight (in kg)? _____

Or (stone and pounds)? _____

What is your height (in m)? _____

Or (feet and inches)? _____

Social Appearance Anxiety Scale (SAAS)

Directions: Please indicate how characteristic each statement is of you, using the response scale provided.

Not at all (1) A little (2) Sometimes (3) A lot (4) Extremely (5)

1. I feel comfortable with the way I appear to others.
2. I feel nervous when having my picture taken.
3. I get tense when it is obvious people are looking at me.
4. I am concerned people would not like me because of the way I look.
5. I worry that others talk about flaws in my appearance when I am not around.
6. I am concerned people will find me unappealing because of my appearance.
7. I am afraid that people find me unattractive.
8. I worry that my appearance will make life more difficult for me.
9. I am concerned that I have missed out on opportunities because of my appearance.
10. I get nervous when talking to people because of the way I look.
11. I feel anxious when other people say something about my appearance.
12. I am frequently afraid I would not meet others' standards of how I should look.
13. I worry people will judge the way I look negatively.
14. I am uncomfortable when I think others are noticing flaws in my appearance.
15. I worry that a romantic partner will/would leave me because of my appearance.
16. I am concerned that people think I am not good looking.

Scoring – Add up item scoring. Note item 1 is reverse coded

Eating Disorder Examination Questionnaire (EDEQ-7)

Instructions: The following questions are concerned with the past week (7 days) only. Please read each question carefully. Please answer all the questions. Thank you.

Questions 1 to 3: Please circle the appropriate number on the right. Remember that the questions only refer to the past week (7 days)

	No days	1 day	2 days	3-4 days	5 days	6 days	Every day
Have you been consciously trying to limit the amount of food you eat to influence your shape or weight?	0	1	2	3	4	5	6
Have you attempted to avoid eating any foods which you like in order to influence your shape or weight?	0	1	2	3	4	5	6
Have you attempted to follow definite rules regarding your eating in order to influence your shape or weight; for example, a calorie limit, a set amount of food, or rules about what or when you should eat?	0	1	2	3	4	5	6

Questions 4 to 7: Please circle the appropriate number on the right. Remember that the questions only refer to the past four weeks (28 days).

	Not at all	Slightly		Moderately		Markedly	
Has your weight influenced how you think about (judge) yourself as a person?	0	1	2	3	4	5	6
Has your shape influenced how you think about (judge) yourself as a person?	0	1	2	3	4	5	6
How dissatisfied have you felt about your weight?	0	1	2	3	4	5	6
How dissatisfied have you felt about your shape?	0	1	2	3	4	5	6

Scoring;

To calculate subscale scores add up scores (0-6) for the questions included in the subscale and divide by the number of questions in the subscale.

Subscales:

Dietary Restraint – question 1,2,3

Shape/Weight Overvaluation – questions 4,5

Body Dissatisfaction – questions 6, 7

To calculate the global score add up the subscale scores and divide by 3.

BSQ-8C

We should like to know how you have been feeling about your appearance over the **PAST WEEK**. Please read each question and circle the appropriate number to the right. Please answer all the questions.

OVER THE PAST WEEK:

	Never	Rarely	Sometimes	Often	Very often	Always
1. Have you been afraid that you might become fat (or fatter)?.....	1	2	3	4	5	6
2. Has feeling full (e.g. after eating a large meal) made you feel fat?.....	1	2	3	4	5	6
3. Has thinking about your shape interfered with your ability to concentrate (e.g. while watching television, reading, listening to conversations)?.....	1	2	3	4	5	6
4. Have you imagined cutting off fleshy areas of your body?.....	1	2	3	4	5	6
5. Have you felt excessively large and rounded?.....	1	2	3	4	5	6
6. Have you thought that you are in the shape you are because you lack self-control?.....	1	2	3	4	5	6
7. Has seeing your reflection (e.g. in a mirror or shop window) made you feel bad about your shape?.....	1	2	3	4	5	6
8. Have you been particularly self-conscious about your shape when in the company of other people?.....	1	2	3	4	5	6

Scoring - Each item is scored 1 to 6 with "Never" = 1 and "Always" = 6 and the overall score is the total across the 8 items.

8 item score	Classification
less than 19	no concern with shape
19 to 25	mild concern with shape
26 to 33	moderate concern with shape
over 33	marked concern with shape

Patient Health Questionnaire (PHQ-4)**PHQ-4**

Over the last week how often have you been bothered by the following problems?	Not at all	Several Days	More than half the days	Nearly every day
Feeling nervous anxious or on edge	0	1	2	3
Not being able to stop or control worrying	0	1	2	3
Little interest or pleasure in doing things	0	1	2	3
Feeling down, depressed, or hopeless	0	1	2	3

PHQ-4 Scoring: Total score ranges from 0 to 12, with categories of psychological distress as follows:

- None: 0-2
- Mild: 3-5
- Moderate: 6-8
- Severe: 9-12

Anxiety subscale = sum of items 1 and 2 (score range: 0 to 6)

Depression subscale = sum of items 3 and 4 (score range: 0 to 6)

On each subscale, a score of 3 or greater is considered positive for screening purposes.

Acceptability Questionnaire

How willing would you be to complete the survey intervention again if it was offered?

Totally unwilling

Very happy to

1

2

3

4

5

6

7

Appendix 7: Normality tests**SAAS*****Skewness and Kurtosis***

	Wait-active		Active Wait	
	Skewness	Kurtosis	Skewness	Kurtosis
Time point 1	-0.052	-1.138	.597	1.154
Time point 2	-0.392	0.191	.417	0.09
Time point 3	0.754	-0.493	0.129	0.116
Time point 4	0.679	-0.418	-0.341	-0.642

Shapiro-Wilk Test

	Wait-active		Active Wait	
	Statistic	Significance	Statistic	Significance
Time point 1	0.955	0.637	0.196	0.107
Time point 2	0.982	0.984	0.966	0.824
Time point 3	0.900	0.113	0.991	1
Time point 4	0.917	0.2	0.953	0.601

BSQ***Skewness and Kurtosis***

	Wait-active		Active Wait	
	Skewness	Kurtosis	Skewness	Kurtosis
Time point 1	-0.163	-1.281	0.063	-1.001
Time point 2	-0.009	-0.778	.499	-0.483
Time point 3	0.377	-0.976	0.467	-0.698
Time point 4	1.120	0.599	0.07	-1.668

Shapiro-Wilk Test

	Wait-active		Active Wait	
	Statistic	Significance	Statistic	Significance
Time point 1	0.925	0.260	0.955	0.638
Time point 2	0.957	0.673	0.926	0.270
Time point 3	0.948	0.532	0.943	0.452
Time point 4	0.868	0.04	0.899	0.109

EDEQ-Global**Skewness and Kurtosis**

	Wait-active		Active Wait	
	Skewness	Kurtosis	Skewness	Kurtosis
Time point 1	0.247	-1.404	0.458	-0.129
Time point 2	0.185	-1.028	0.861	0.883
Time point 3	0.689	0.123	0.721	0.624
Time point 4	1.102	0.250	0.011	-0.069

Shapiro-Wilk Test

	Wait-active		Active Wait	
	Statistic	Significance	Statistic	Significance
Time point 1	0.918	0.203	0.950	0.557
Time point 2	0.959	0.704	0.931	0.316
Time point 3	0.936	0.368	0.959	0.702
Time point 4	0.870	0.042	0.987	0.997

EDEQ-Drive for Thinness***Skewness and Kurtosis***

	Wait-active		Active Wait	
	Skewness	Kurtosis	Skewness	Kurtosis
Time point 1	0.663	-0.889	0.906	0.513
Time point 2	0.495	-0.860	0.811	0.256
Time point 3	0.966	-0.269	1.015	-0.286
Time point 4	0.976	-0.521	0.154	-1.668

Shapiro-Wilk Test

	Wait-active		Active Wait	
	Statistic	Significance	Statistic	Significance
Time point 1	0.880	0.057	0.919	0.210
Time point 2	0.918	0.204	0.916	0.198
Time point 3	0.847	0.02	0.832	0.013
Time point 4	0.814	0.008	0.878	0.054

EDEQ-Shape and Weight Over-evaluation***Skewness and Kurtosis***

	Wait-active		Active Wait	
	Skewness	Kurtosis	Skewness	Kurtosis
Time point 1	-0.646	-0.961	-0.403	-0.237
Time point 2	-0.256	-1.084	0.433	-0.235
Time point 3	0.563	0.563	0.783	-0.478
Time point 4	0.916	-0.562	-0.123	-0.889

Shapiro-Wilk Test

	Wait-active		Active Wait	
	Statistic	Significance	Statistic	Significance
Time point 1	0.932	0.324	0.875	0.05
Time point 2	0.941	0.437	0.947	0.515
Time point 3	0.894	0.093	0.939	0.401
Time point 4	0.950	0.559	0.833	0.013

EDEQ-Body Dissatisfaction**Skewness and Kurtosis**

	Wait-active		Active Wait	
	Skewness	Kurtosis	Skewness	Kurtosis
Time point 1	-0.763	-0.747	0.398	-1.560
Time point 2	-0.812	-0.384	-0.03	-0.347
Time point 3	0.307	-0.438	0.03	0.155
Time point 4	0.249	-1.059	-0.346	0.720

Shapiro-Wilk Test

	Wait-active		Active Wait	
	Statistic	Significance	Statistic	Significance
Time point 1	0.842	0.17	0.859	0.03
Time point 2	0.959	0.711	0.893	0.09
Time point 3	0.979	0.971	0.961	0.732
Time point 4	0.962	0.749	0.928	0.284

PHQ- Anxiety***Skewness and Kurtosis***

	Wait-active		Active Wait	
	Skewness	Kurtosis	Skewness	Kurtosis
Time point 1	-0.479	-0.781	1.276	0.835
Time point 2	0.045	-0.156	0.871	0.856
Time point 3	0.406	-0.164	0.560	-0.775
Time point 4	-0.093	-1.362	0.438	-1.302

Shapiro-Wilk Test

	Wait-active		Active Wait	
	Statistic	Significance	Statistic	Significance
Time point 1	0.928	0.288	0.806	0.006
Time point 2	0.931	0.314	0.875	0.049
Time point 3	0.920	0.222	0.889	0.077
Time point 4	0.917	0.200	0.878	0.055

PHQ- Depression***Skewness and Kurtosis***

	Wait-active		Active Wait	
	Skewness	Kurtosis	Skewness	Kurtosis
Time point 1	0.586	1.096	0.713	-0.349
Time point 2	1.064	0.521	-0.625	-1.192
Time point 3	0.511	-1.142	0.321	-0.633
Time point 4	0.625	-1.140	1.253	2.109

Shapiro-Wilk Test

	Wait-active		Active Wait	
	Statistic	Significance	Statistic	Significance
Time point 1	0.881	0.06	0.881	0.59
Time point 2	0.831	0.013	0.767	0.002
Time point 3	0.866	0.037	0.806	0.006
Time point 4	0.862	0.032	0.858	0.028

Appendix 8: Interaction Graphs for non-significant interactions

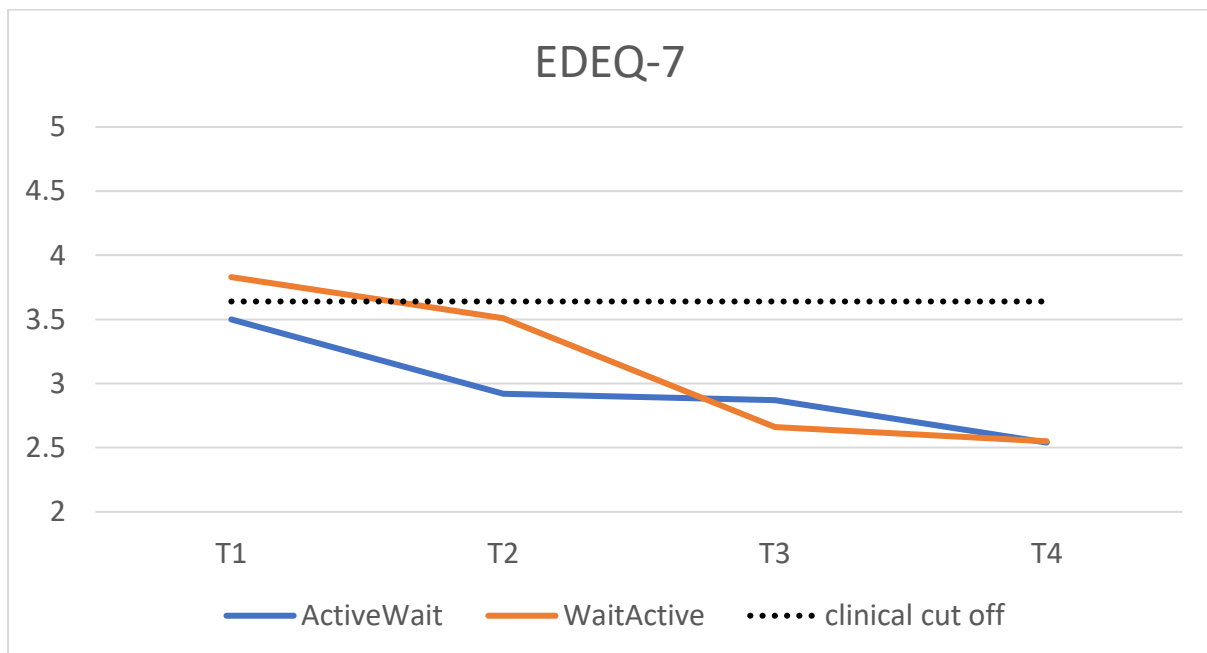


Figure - EDEQ-7 global Time and Group Interaction

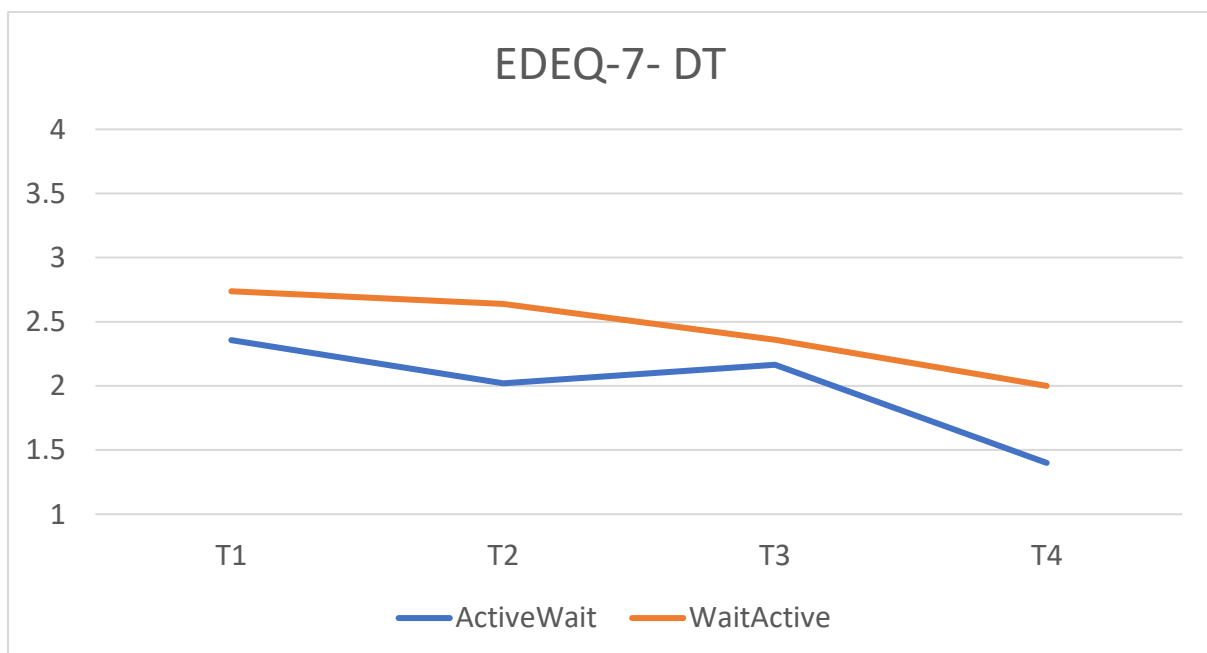


Figure - EDEQ-7 Drive for Thinness Time and Group Interaction

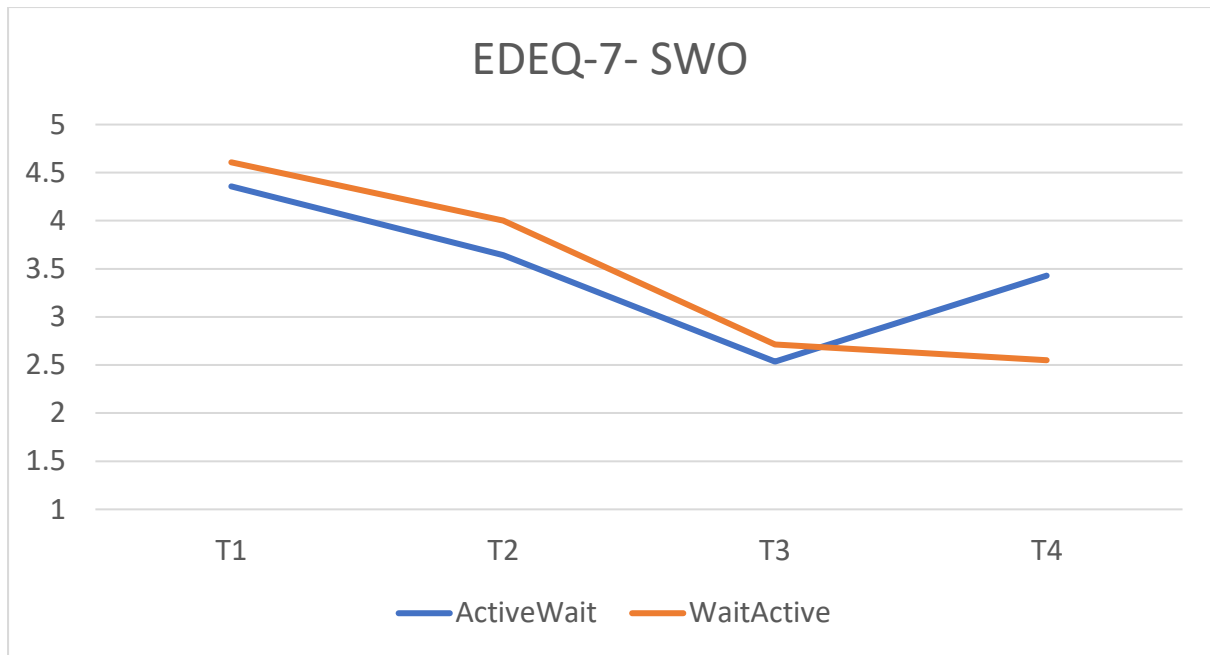


Figure - EDEQ-7 Shape and Weight Overevaluation Time and Group Interaction

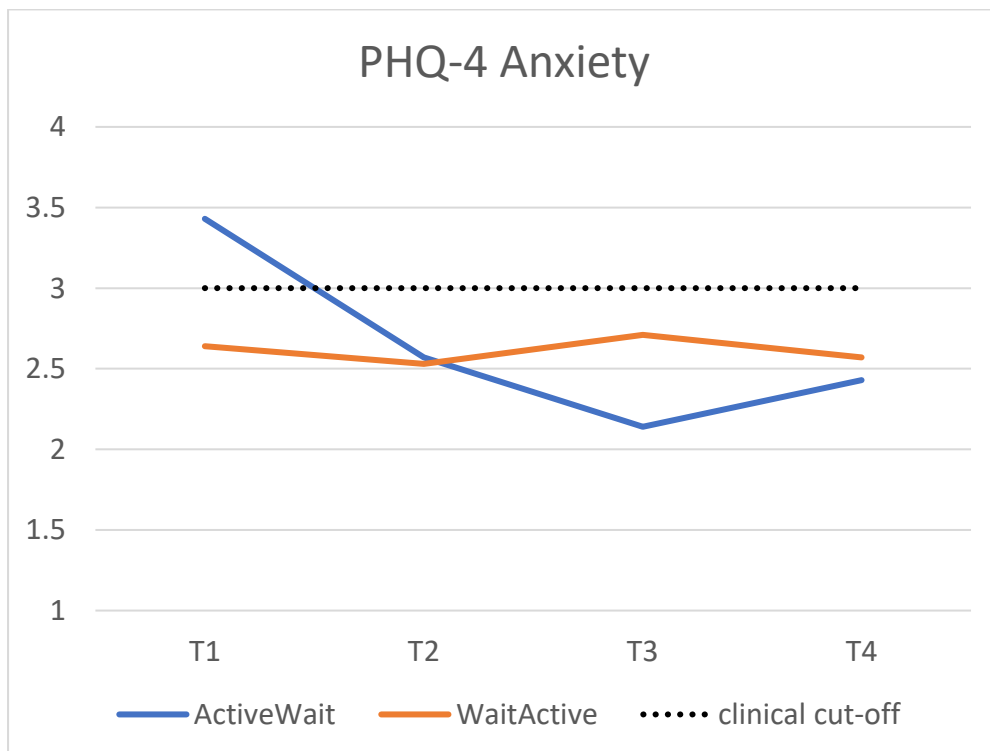


Figure - Anxiety Time and Group Interaction

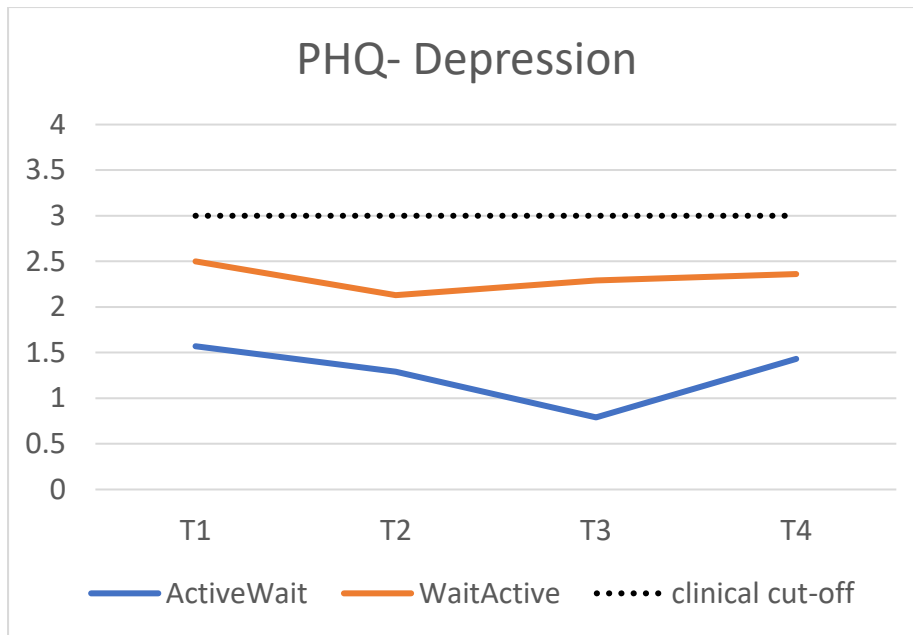


Figure - Depression Time and Group Interaction