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The use of computer-assisted therapy (AVATAR therapy) to reduce the power of the eating disorder voice in patients with Anorexia Nervosa

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VOLUME I

SYSTEMATIC LITERATURE REVIEW

&

EMPIRICAL RESEARCH PROJECT

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Thesis submitted in partial fulfilment of the degree of

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SYSTEMATIC REVIEW

A systematic review of social rank perception and contribution to eating disorder psychopathology in people with eating disorders

Supervised by Dr Thomas Ward and Dr Valentina Cardi

Abstract

Background and Aims: Social Rank theory is an evolutionary theory based on the idea that achieving enhanced social rank is an essential biosocial goal for all individuals. This theory has been applied to understand the aetiology and psychopathology of Eating Disorders (EDs), with the suggestion that individuals with EDs could be more likely than controls to focus excessively on social rank and how they stand in relation to others based on physical appearance. The aim of the current systematic review was to identify, evaluate and synthesise existing literature exploring social rank and related constructs (e.g., submissiveness, inferiority) in eating disorders, to shed light on how individuals with EDs perceive their social rank compared to others and the relationship between perceived social rank and ED psychopathology.

Method: Five databases (Embase, Medline, PsychINFO, Web of Science, PubMed) were systematically searched in April 2021 for relevant studies. Studies were included if they involved a clinical sample of people with an ED, used a validated measure to assess social rank or related constructs, were cross-sectional or longitudinal studies, were quantitative in approach, published in peer reviewed journals, and available in English.

Results: Sixteen studies (n= 16), involving a total of 3,581 participants, with a diagnosis of AN, BN, or BED were included in the current review. Most of the studies employed a cross-sectional design (n= 12) and a minority used a prospective cohort study design (n= 3), with only one study employing an ecological momentary assessment (n= 1). A control group of healthy participants was included in most of the studies (n= 11). The quality of retrieved manuscripts was assessed using the National Institutes of Health (NIH) Quality Assessment Tool for Observational Cohort and Cross-Sectional Studies.

Discussion: Overall, findings from the studies showed that individuals with EDs perceive their social rank as lower compared to healthy controls and present characteristic features of low social rank such as high levels of submissiveness, non-assertiveness, exploitability, rejection sensitivity, and feelings of shame and inferiority. Importantly, the perception of being of low social rank was significantly associated with more severe ED psychopathology, potentially suggesting that ED symptoms have the function of restoring or maintaining social rank. These findings were mainly drawn from cross-sectional studies, and the mechanistic role of social rank in the aetiology and maintenance of the ED, remains unclear. The current review highlighted the need for more longitudinal research to shed light on the role of social rank in the onset and maintenance of EDs, and the importance of accounting for interpersonal processes and difficulties, such as social rank issues, in the treatment of EDs.

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1. Introduction

1.1 Eating disorders

Eating disorder (ED) is the umbrella term used to describe a range of psychiatric conditions which are commonly characterised by severe and persistent disturbances in eating behaviours and distressing emotions and cognitions related to food, weight, and physical appearance (American Psychiatric Association, 2013). They are conditions which often have significant impact on individuals' physical, psychological, and social functioning. In the United Kingdom (UK), it is estimated that over 1.6 million people suffer from an EDs (Health Survey for England, 2019). In 2019, the Health Survey for England (2019) stated that up to 16% of adults aged 16 and over screened positive for a possible ED. It is estimated that the lifetime prevalence of all EDs specified in the Diagnostic and Statistical Manual of Mental Disorders (DSM-5; American Psychiatric Association, 2013) is 8.4% for women and 2.2% for men (National Institute Clinical Excellence, 2017). Subclinical symptoms are even more common, affecting up to 56% of young women (Pernick et al., 2006).

The aetiology of EDs comprises a complex interaction of factors including heritability and biological factors, neuropsychological, socio-emotional, and socio-cultural factors (Treasure & Schmidt, 2013). For instance, Schmidt and Treasure (2006) have proposed a cognitive interpersonal model of AN which combines inter- and intrapersonal factors, whereby symptoms are maintained intra-personally by beliefs about the positive functions of the illness and inter-personally by the positive and negative responses elicited from others by the physical presentation and behaviours associated with AN. Additionally, the model advocates a role of personality traits, such as obsessive-compulsive and perfectionism traits, as vulnerability factors for the disorder (Schmidt and Treasure, 2006). Personality traits can be defined as relatively stable and consistent internal characteristics that are inferred from a pattern of behaviours, attitude and feelings in the individual (Matthews & Deary, 2003). Traits may represent a consistent pattern set up by a person's environment rather than something that they were born with, and it is often the interaction between the individual's traits and environmental, social, familiar or traumatic experiences that may lead to the development of an EDs (Bulik, 2005). EDs tend to develop in adolescence and young adulthood and are more common in girls and women than males (National Institute Clinical Excellence, 2017). However, they can also develop later in life and in males (National Institute Clinical Excellence, 2017).

The clinical presentation and symptom psychopathology vary depending on the type of ED. The most known and frequently diagnosed types of EDs are Anorexia Nervosa (AN), Bulimia Nervosa (BN) and Binge Eating Disorder (BED). Other types include Avoidant and Restrictive Food Intake Disorder (ARFID) and Feeding Disorders. Individuals whose symptoms do not match the expected symptoms for any specific EDs are diagnosed as Other Specified Eating Disorder (OSFED), which is the most common form of EDs (National Institute Clinical Excellence, 2017; Academy for Eating Disorders, 2014). A study by Hay and colleagues (2017) found that AN accounted for 8% of cases, BN for 19%, BED for 22%, ARFID for 5%, and OSFED for the remaining 47%.

1.1.1 Anorexia Nervosa

Anorexia nervosa (AN) is characterised by the restriction of energy intake followed by extremely low body weight, an intense fear of gaining weight and distorted cognitions regarding weight and shape, and a drive for thinness (American Psychiatric Association, 2013). There are two different types of anorexia: *Anorexia Nervosa – Restrictive* type (AN-R) where individuals restrict the number of calories and the types of food they eat; and *Anorexia Nervosa – Binge Purging* type (AN-BP) where individuals with the disorder also engage in binge eating behaviour and compensate by exercising compulsively and/or purging (American Psychiatric Association, 2013). AN tends to develop in late childhood or early adolescence (National Institute Clinical Excellence, 2007). It has the highest mortality rate of any psychiatric disorder in adolescence and serious medical complications which can be life threatening, including heart rhythm abnormalities, kidney problems and seizures. Of those surviving, 50% recover, whereas 30% improve and 20% remain chronically ill (National Institute Clinical Excellence, 2017).

1.1.2 Bulimia Nervosa

Bulimia Nervosa (BN) is characterised by recurrent episodes of binge eating, namely eating a very large amount of food in short periods of time, with a sense of lack of control (American Psychiatric Association, 2013). The binge eating episodes are followed by recurrent compensatory behaviours in order to prevent weight gain, such as self-induced vomiting, misuse of laxatives, diuretics, or other medications, fasting, or excessive physical exercise (American Psychiatric Association, 2013). Binge behaviour is usually secretive and associated with feelings of shame or embarrassment. Individuals with BN are usually normal weight, overweight or even obese. The binge eating and compensatory behaviours can lead to rare but potentially fatal complications, including oesophageal tears, gastric rupture, and dangerous cardiac arrhythmias. BN tends to develop slightly later than AN, with the peak age of onset in late adolescence and early adulthood (National Institute Clinical Excellence, 2017)

1.1.3 Binge Eating Disorder

Binge Eating Disorder (BED) is characterised by recurrent binge eating episodes in which individuals consume large quantities of food in a brief period, experience a sense of loss of control over their eating, and are distressed, embarrassed, disgusted and guilty about the binge behaviour (American Psychiatric Association, 2013). Differently from BN, people with BED do not regularly use compensatory behaviours (American Psychiatric Association, 2013). BED can lead to serious health complications, including obesity, diabetes, hypertension and cardiovascular diseases (National Institute Clinical Excellence, 2017). The prevalence in males is higher compared to AN and BN and it is identified more often at an older age (National Institute Clinical Excellence, 2017).

1.2 Social rank theory

Social Rank theory is an evolutionary theory grounded in the idea that achieving enhanced social rank is an essential biosocial goal for all individuals (Gilbert, 1992). Ranking occurs in all social species where there is competition for resources (e.g. food and mates) and has evolved to regulate behaviour and social interactions and ensure survival of the species, as those who achieve high social rank are more likely to survive and pass on their genes (Gilbert, 1992; Stevens & Price, 2000).

Social attractiveness, rather than dominance by aggression, is the preferred strategy for humans to achieve high social rank, and this is accomplished by displaying attractiveness, talent and competence (Gilbert, 1992; 1997; Troop et al., 2014). In fact, for humans, being attractive, approved, and accepted by others is crucial and constitutes a fundamental motivation (Baumeister & Leary, 1995; Gilbert, 1997; Ma & Kelly 2020), whereas loss of acceptance and approval constitutes a major social threat (Pinto Gouveia, Ferreira & Duarte, 2014). On one side, high social rank offers greater chances of prosperity and survival, by ensuring greater success at securing resources as well as access to mates (Gilbert, 1989, 1992). On the other side, individuals low in the social hierarchy have little prospect of winning conflicts and must resolve social conflict by submission or escape (Gilbert & Allan, 1998).

The social rank system promotes social comparisons as a way of appraising one's relative rank, and individuals consider themselves to be high or low social rank on the basis of how they perceive that others view them, and not on more objective characteristics or outcomes (e.g. socioeconomic status, professional status) (Price et al., 1994; Gilbert, Price & Allan, 1995). Therefore, humans have evolved to be highly sensitive to social cues and have developed an innate drive to stimulate positive affect in the mind of others (Buss, 2003; Gilbert, 2005a). According to one's perception of being either high or low social rank there are related feelings and behaviours (e.g. submissiveness vs. dominance) (Duarte, Ferreira & Pinto-Gouveia, 2016; Gilbert et al., 2004; Troop et al., 2014). High social rank is characterised by dominance, assertiveness, competence and talent (Fournier, Moskowitz & Zuroff, 2002; Gilbert, 1992; Troop et al., 2014). In contrast, low social rank is characterised by submissive behaviour and feelings of inferiority and shame (Allan & Gilbert, 1995; Connan et al., 2007; Troop et al., 2014). Social rank theory also suggests that submissive behaviour can occur as a way of signalling to dominant others that an individual does not want to compete (Price et al., 2007). In fact, becoming withdrawn and subordinate to others can have an evolutional value, as it might reduce risk of injury or death from unsuccessful conflicts (Price & Sloman, 1987).

Social rank theory has been applied to the study of psychopathology, with research suggesting that perceptions of low social rank are an important contributor for emotional distress and mental health problems (e.g. depression; anxiety disorders; psychosis) (Allan & Gilbert, 1995; Duarte, Ferreira & Pinto-Gouveia, 2016; Sturman, 2011; Sturman & Mongrain, 2008). Social rank is associated with a series of constructs, such as feelings of inferiority, defectiveness, submissiveness, shame, low self-esteem, self-criticism, insecure attachment which are frequently found in many mental health conditions and can contribute to the aetiology and maintenance of such problems (Cardi et al., 2014; Connan et al., 2007; Duarte, Ferreira & Pinto-Gouveia, 2016; Pinto-Gouveia, Ferreira & Duarte, 2014; Troop et al., 2003, 2014).

1.3 Eating Disorders and Social Rank

Eating disorders are multi-factorial with a complex aetiology that involves the interaction of biological, psychological, social, and familial factors (Szmukler, Dare, & Treasure, 1995). It is established in the literature that interpersonal difficulties can be a vulnerability and predisposing factor for EDs as well as a maintaining factor (Arcelus et al., 2013; Caglar-Nazali et al., 2014), and research has started to suggest that many of these difficulties could relate to issues of social rank (Cardi et al., 2014; Duarte, Ferreira & Pinto-Gouveia, 2016; Troop et al., 2003, 2014).

Social rank on the basis of physical appearance can be particularly relevant to understand the aetiology and psychopathology of ED, where individuals with ED might focus excessively on social rank and how they stand in relation to others based on body image (Duarte, Ferreira & Pinto-Gouveia, 2016; Matos et al., 2015; Troop, 2003). Additionally, ED symptoms might have the function of restoring or maintaining social rank, as well as coping with the difficult emotions arising from perceiving oneself as low social rank (Duarte et al., 2006; Schmidt & Treasure, 2006; Troop et al., 2003, 2014). In fact, physical appearance is a central self-evaluative dimension, which is often perceived as an indicator of social resources and reproductive potential, and, in Western societies, it is closely linked to social approval, success, and power (Gilbert et al., 1995; Ferreira, Pinto-Gouveia & Duarte, 2013; Matos et al., 2015).

Individuals with ED commonly present cognitive, affective and interpersonal features that are indicative of low social rank (Ambwani et al., 2016; Cardi et al., 2014; Duarte, Ferreira & Pinto-Gouveia, 2016; Troop et al., 2003, 2014). These features are also evident in recovered individuals, suggesting it might be a trait vulnerability factor (Cardi, Di Matteo, Gilbert, & Treasure, 2014; Connan et al., 2007). For instance, a systematic review and meta-analysis of social processing in anorexia conducted by

Caglar-Nazali and colleagues (2014) reported high levels of submissive behaviour, negative social comparison, and low self-esteem. Similarly, studies examining coping responses to stressful events showed that individuals with ED tend to report increased levels of ineffectiveness, helplessness and inefficacy compared to controls (Connan et al., 2007; Troop & Treasure, 1997a). Additionally, common affective responses related to low social rank are consistently reported in the eating-disorder literature, such as shame, jealousy and inefficacy (Murphy, Troop & Treasure, 2000).

In the ED literature, there are also reports of other factors that can contribute to the perception of low social rank. For instance, a study by Dakanalis and colleagues (2014) estimated that 96–100% of women with EDs have an insecure attachment style. Insecure attachment can lead to negative social evaluation and sensitivity to rejection and the perception that one is of low social rank (Arcelus et al., 2013; De Paoli et al., 2017). Individuals with EDs often present a heightened sensitivity to rejection, which motivates them to engage in ED symptoms to avoid such criticism and rejection (Cardi et al., 2013; De Paoli et al., 2017; Pinto-Gouveia, Ferreira, & Duarte, 2014).

1.4 Objectives

The role of different interpersonal processes in ED has been explored and synthesized in previous systematic reviews; however, there are no systematic reviews which focus specifically on social rank perception and EDs. Therefore, the aim of the current systematic review is to identify, evaluate and synthesise existing literature on social rank, and related constructs (e.g. submissiveness, social comparison, inferiority) in EDs, to address two main questions:

(1) How do individuals with eating disorders perceive their social rank compared to others?

(2) What is the relationship between perceived social rank and related constructs (submissiveness, inferiority) and ED psychopathology?

According to the literature presented above, the following two hypotheses will be explored:

Hypothesis 1:

(a) individuals with eating disorders will perceive their social rank as lower (compared to healthy controls - if included in the study)
(b) they will present higher levels of submissiveness, non-assertiveness, exploitability, rejection sensitivity, and shame (compared to heathy controls – if present)

Hypothesis 2: low social rank and related characteristics (e.g. submissiveness, non-assertiveness, exploitability) will show a significant positive correlation with eating disorder psychopathology

This project has the potential to inform future research in this area and psychological interventions for eating disorders about the specific difficulties that might arise in relation to social rank.

2. Method

2.1 Search strategy

The electronic databases Embase (1974 - present), Medline (1946 - present) and PsychINFO (1806 – present) by using Ovid and Web of Science (1900 – present) and PubMed (1996 - present) were searched. The search was done for all studies published up to the search date and were limited to papers written in English. The search terms used were as follows:

eating disorder* OR anorexi* OR bulimi* OR binge eating disorder OR Feeding Disorder OR Eating Disorders Not Otherwise specified OR EDNOS OR other specified feeding or eating disorder OR OSFED OR Feeding disorder* OR Avoidant Restrictive Food Intake Disorder OR ARFID **AND** social rank* OR social comparison OR social hierarchy OR interpersonal rank* OR social defeat OR inferiority OR submissive.

2.2 Eligibility criteria

Studies were eligible for inclusion in the review if they met the following criteria:

(1) included a clinical sample of people with an eating disorder: Anorexia Nervosa (AN), Bulimia Nervosa (BN), Eating Disorder Not Otherwise Specified (EDNOS), other specified feeding or eating disorder (OSFED), Binge Eating Disorder (BED), Feeding disorder, Avoidant Restrictive Food Intake Disorder (ARFID). Only studies including participants who had received a diagnosis made by a clinician based on the DSM-V criteria were included.

(2) used a validated measure to assess social rank or related constructs such as social comparison, submissive behaviour, social defeat

(3) cross-sectional or longitudinal studies

(4) published in English

(5) published in a peer-reviewed journal

Studies were excluded if they:

(1) were single case studies, reviews, discussions, commentaries, dissertations

(2) did not include any quantitative data (i.e. solely conceptual description of a theory or of a psychometric scale)

2.3 Study selection

The search and selection of papers were based on the PRISMA guidelines (Moher et al., 2009). As shown in figure 1, 2143 records resulted from the initial search of the 5 electronic databases. After duplicates were identified and removed, 1,030 unique records remained. Endnote, Version 9.3.3 (Reuters, 2016) was used to manage the data. CC independently screened all 1,030 titles and abstracts, to identify potentially eligible studies against the eligibility criteria. This resulted in 56 manuscripts being identified for full text review. Based on full-text screening, a further 40 articles were excluded and, therefore, 16 studies were eligible for inclusion. Reasons for exclusion were articles not including a clinical sample with ED, articles not including outcome evaluation, articles not measuring social rank with a standardised scale, meta-analysis, or analytic studies. All full-text papers were cross-checked against the eligibility criteria by a second researcher (AT). Outstanding queries about eligibility were discussed with the author’s supervisors (TW and VC) until consensus was reached. A total of 16 papers were included in the review.

PRISMA 2009 Flow Diagram

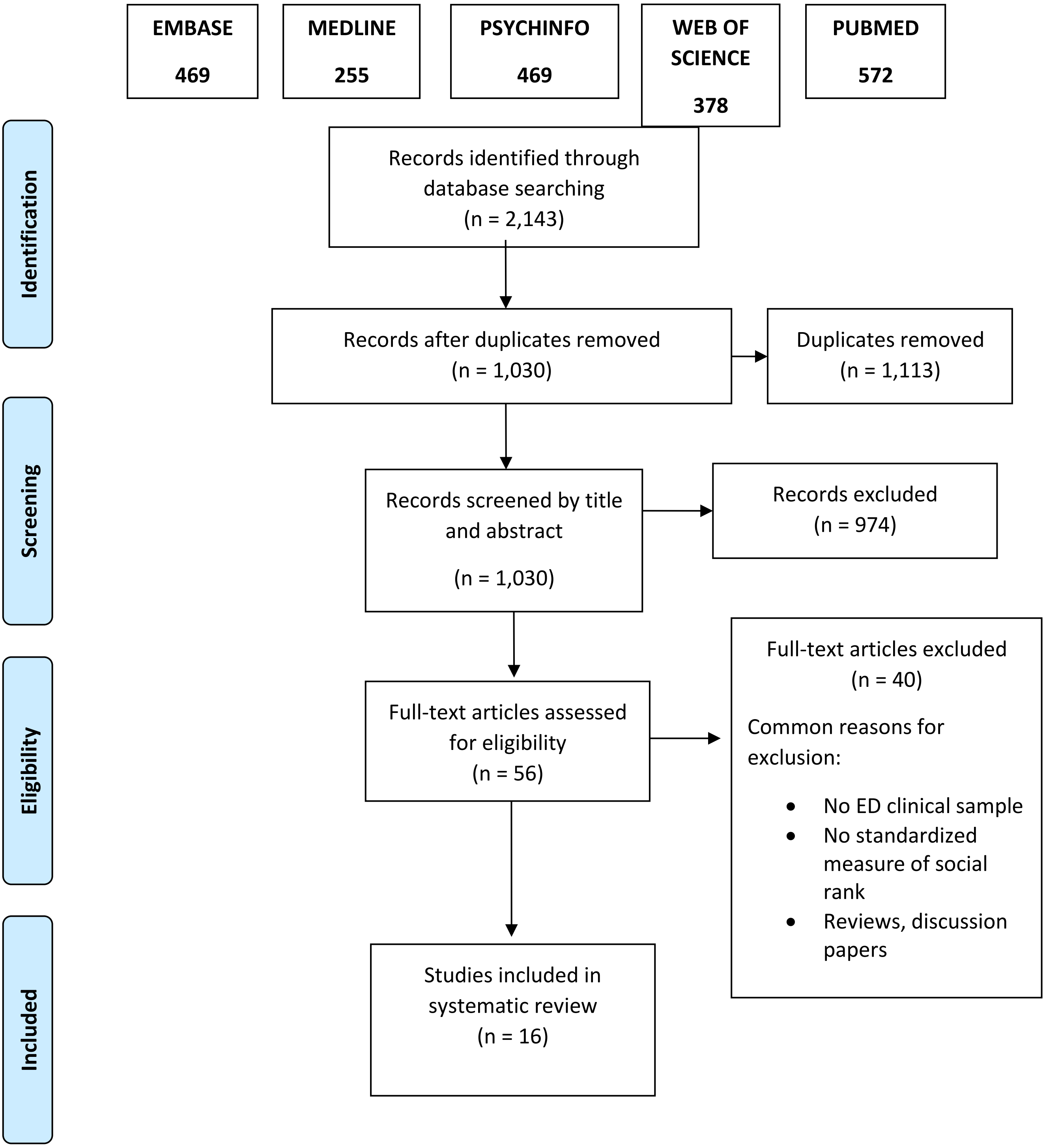

Figure 1. PRISMA Flow Diagram (Moher et al., 2010)

2.4 Data extraction

The following data were extracted from the 16 included studies:

(1) Study characteristics, including main author and publication year

(2) Sample characteristics, including sample size, primary diagnosis, mean age, gender rates, length of illness, and BMI

(3) Standardised measures of social rank or related constructs

(4) standardised measures of ED symptomatology and other psychological constructs

(4) key research questions and key findings in relation to social rank and the eating disorder

2.5 Quality assessment

The quality of retrieved manuscripts was assessed using the National Institutes of Health (NIH) Quality Assessment Tool for Observational Cohort and Cross-Sectional Studies (NIH, 2014). This tool assesses the quality of studies against 14 criteria, by answering each question with YES (i.e. criteria met), NO (i.e. criteria not met), Cannot Determine (CD, i.e. the question cannot be answered), Not Applicable (NA, the criteria cannot be applied due to the nature of the study), Not recorded (NR, i.e. the information to answer the question is not reported in the study). The tool assesses different aspects of the study, such as research question, study population and recruitment, sample size justification, exposure assessed prior to outcome measurement, exposure and outcome measures, statistical analysis (see appendix A).

3. Results

3.1 Characteristics of included studies

3.1.1 Sample Characteristics

Sample characteristics are reported in table 1. A total of 3,581 participants were included in the reviewed studies. Sample sizes ranged from 23 participants (Ma & Kelly, 2020) to 744 participants (De Paoli et al., 2017). Participants included in the studies were aged 16 to 70 years. There was a strong trend towards participants being female. Ten of the 19 studies reported their sample as 100% female whereas the other 9 studies included male participants, although the proportion of males was still quite low ranging from 2% (Cardi et al., 2018) to 35% (Blomquist et al., 2012). In terms of clinical diagnosis, 6 studies included a sample of participants with AN only, and 3 studies included only participants with BED. The remaining studies involved more than one diagnosis, with 5 studies including participants with AN and BN and 2 studies involving all three conditions (i.e. AN, BN, BED). Only four studies reported duration of illness, which ranged from 7.1 years (Carter, Kelly & Norwood, 2012) to 10.5 years (Cardi et al., 2014). The majority of studies (N = 14) reported the Body Mass Index for participants, which varied depending on the clinical group included (see table 1 for details).

3.1.2 Study Characteristics

Study characteristics are reported in table 1. The majority of the studies employed a cross-sectional design (N= 12). Three studies utilised a prospective cohort study design (Brugnera et al., 2019; Carter, Kelly & Norwood, 2012; Hartman, Zeeck & Barrett, 2010). Two studies did not report the length of time between baseline data collection and follow-up, but only described it as pre- and post-treatment (Carter, Kelly & Norwood, 2012; Hartman, Zeeck & Barrett, 2010). In the other study (Brugnera et al., 2019), the length of time between baseline data collection and follow-up was 12 months. One study (Ma & Kelly, 2020) employed an ecological momentary assessment (EMA), which assessed participants repeatedly in their natural environment in real time. The majority of studies included a control group of healthy participants (i.e. not having a diagnosis of ED) (N= 11).

3.1.3 Measurement of Social rank and related constructs

With regard to the assessment of social rank, the most common measure used was the Social Comparison Rating Scale (SCRS) (Allan & Gilbert, 1995), a self-report scale in which respondents rate their perception of self in relation to others (N= 6). In the social rank literature, this is considered the gold-standard measure that has been developed to directly assess how individuals rank themselves compared to others. The scale asks individuals to rank themselves compared to others on 11 bipolar constructs using a semantic differential approach, thereby ranking themselves from a more negative attribute (e.g., inferior, incompetent) to a more positive attribute (e.g., superior, more competent).

Other standardised measures that assess related constructs of social rank were employed by the other studies. Five studies used the Inventory of Interpersonal Problems (IIP; Horowitz et al., 2000), a self-report measure of interpersonal problems and distress. This scale is based on a two-dimensional circumplex model that views every interpersonal behaviour along two dimensions: an affiliation dimension ranging from cold (hostile) behaviour to warm (overly nurturant) behaviour and a dominance dimension that ranges from non-assertive (submissive) to domineering (controlling) behaviour. In addition, some studies used the Submissive Behaviour Scale (SBS; Allan & Gilbert, 1997), a self-report measure where participants rate how they act and feel about social situations (N = 4), and the Social Comparison Through Physical Appearance Scale (SCPAS; Ferreira, Pinto-Gouveia & Duarte, 2013), a self-report measure of social comparisons based on physical appearance (N = 2).

3.1.4 Measurement of Eating Disorder psychopathology

A large proportion of studies used the Eating Disorder Examination Questionnaire (EDE-Q; Fairburn & Beglin, 1994) to assess eating disorder psychopathology (N= 7). Other measures that were used include: the Eating Disorder Examination interview (EDE-I; Fairburn & Cooper, 1993); the Questionnaire for Eating and Weight Patterns–Revised (QEWP-R; Spitzer, Yanovski & Marcus, 1993); the Binge Eating Scale (BES; Gormally et al., 1982); the Eating Disorder Inventory (EDI; Garner, Olmstead & Polivy, 1983); the Structured Inventory for Anorexic and Bulimic Syndromes (SIAB-S; Fichter et al., 1998); the Short Evaluation of Eating Disorder (SEED; Bauer et al., 2005).

Table 1. Characteristics of included studies

Main author & Year	Title	Clinical group	Design	Clinical Sample characteristics	Healthy control characteristics	Aim of the study (with regard to social rank)	Social rank and related constructs measure	ED measure and other variables measures	Key findings
Ambwani et al., (2016)	Seeing Things Differently: An Experimental Investigation of Social Cognition and Interpersonal Behavior in Anorexia Nervosa	AN	Cross-sectional	**Total N** = 77 (100% females) AN = 31 EDNOS-AN = 10 **Age**: 18-65	HCs = 36	(1) To examine the difference between AN and HCs in relation to: (a) interpersonal self-efficacy (b) perceptions of dominance/submission in other individuals (c) perceptions of coldness/warmth in other individuals (d) hypothetical behavioural reactions	Circumplex Scales of Interpersonal Efficacy (CSIE)	Structured Clinical Interview Diagnostic Tool (SCID)	Comparing AN and HCs, it was found: (a) no difference in interpersonal self-efficacy (b) no difference in perceived submissiveness in the hypothetical behavioural reactions (c) AN perceived more coldness and dominance than HCs (d) AN tended to respond with coldness even to videos that they perceived as being warm and selected cold-submissive responses more frequently than HCs
Blomquist et al., (2012)	Interpersonal problems and developmental trajectories of binge eating disorder	BED	Cross-sectional	**N** = 84 (65% female) **Age =** 47.3 (8.1) **BMI =** 40.4 (6.8)	*No control group*	(1) To examine the interpersonal problems associated with BED (2) To examine the association between interpersonal problems and the timing and sequencing of BED development in terms of onsets of: (a) binge eating (b) dieting	Inventory of Interpersonal Problems–Short Circumplex (IIP-SC)	Eating Disorder Examination interview (EDE-I) Questionnaire for Eating and Weight Patterns–Revised (QEWP-R)	(1) Individuals with BED were found to score higher on interpersonal rigidity, interpersonal distress, and submissiveness (2) Submissive interpersonal interactions were linked with: (a) younger age of first binge and a younger age of meeting BED criteria (b) younger age at dieting onset (c) younger age of onset of becoming overweight

						(c) onset of becoming overweight			
Brugnera et al., (2018)	Patients with Binge Eating Disorder and Obesity have qualitatively different interpersonal characteristics: Results from an Interpersonal Circumplex study	BED	Cross-sectional	**N** = 606 BED = 177 (88% females) **Age** BED = 41.0 (12.5) Obese non-BED = 44.5 (13.4) **BMI** BED = 36.8 (8.2) Obese non-BED = 38.4 (6.5)	HCs = 108 (47% females) **Age** HCs = 37.3 (9.6) **BMI** HCs = 23.8 (2.8)	(1) To evaluate the severity and prototypicality of interpersonal problems among those with BED compared to obese and HCs. (2) To examine the association between interpersonal profiles and psychological distress and symptoms.	Inventory of Interpersonal Problems-32 (IIP-32)	Binge Eating Scale (BES) Outcome Questionnaire -45 (OQ-45.2)	1) Compared to HCs and Obese participants, BED reported higher levels of interpersonal problems on all circumplex dimensions, except for Vindictive. BED had predominant friendly-submissive themes compared to friendly-dominant themes of obese and HCs. 2) Compared to the other two groups, BED reported significantly higher levels of psychological distress and binge eating severity.
Brugnera et al., (2019)	Persistence of friendly and submissive interpersonal styles among those with binge-eating disorder: Comparisons with matched controls and outcomes after group therapy	BED	Prospective cohort	**N =** 205 (100% female) BED = 102 Obese = 50 **Age** BED = 44.42 (11.81) Obese = 46.35 (12.13) **BMI** BED = 38.15 (6.93) Obese = 37.36 (6.47)	HCs = 53 **Age** HCs = 43.39 (11.65) **BMI** HCs = 23.20 (1.97)	(1) To investigate the severity and prototypicality of interpersonal problems in BED compared to obese participants and HCs at baseline and post therapy (2) To investigate the severity of interpersonal problems following psychodynamic psychotherapy (12 months follow-up)	Inventory of Interpersonal Problems (IIP-64)	Eating Disorder Examination Questionnaire (EDE-Q) Beck Depression Inventory II (BDI-II)	1) Compared to HCs, BED had significantly higher levels of interpersonal problems, with predominantly non-assertive and exploitable styles at baseline (2) The intensity of non-assertive interpersonal problems of patients with BED decreased post-group treatment, but their profiles remained prototypically non-assertive and exploitable across all time points

Cardi et al. (2014)	Rank Perception and Self-Evaluation in Eating Disorders	AN; BN	Cross-sectional	**N** = 118 (100% females) AN-R = 29 AN-BP = 9 BN = 17 REC = 22 **Age** ED = 27.3 (10.2) REC = 29.5 (8.4) **Duration of illness** ED = 10.5 (9.5) REC = 8.0 (6.2) **BMI** ED = 19.0 (4.0) REC = 21.8 (2.3)	HCs = 50 **Age** HCs = 25.3 (7.4) **BMI** HCs = 21.7 (1.9)	(1) To investigate automatic processing of social and self-related cues, in terms of: (a) attentional bias to social rank (b) implicit self-evaluation (c) shame (d) submissive behaviour (e) social comparison (2) To examine the link between social and self-related cues and ED symptoms	The Social Comparison Scale (SCS) The Submissive Behaviour Scale (SBS) The Other as Shamer Scale (OAS)	Eating Disorder Examination Questionnaire (EDE-Q) Depression Anxiety Stress Scales (DASS) The Personal Feelings Questionnaire (PFQ-2)	(1) Compared with HCs: (a) ED and REC showed increased vigilance toward rank-related stimuli (b) EDs had significantly lower self-evaluation scores (c) EDs reported higher levels of shame (d) EDs reported higher levels of submissive behaviour (e) EDs showed unfavourable social comparison (2) In the ED groups, self-evaluation significantly predicted eating disorders symptoms
Cardi et al., (2018)	Social Difficulties As Risk and Maintaining Factors in Anorexia Nervosa: A Mixed-Method Investigation	AN; atypical AN	Cross-sectional	**Total N** = 90 (98% female) AN = 60 Atypical AN = 30 **Age** = 28.9 (11.1) **Duration of illness** = 8.4 (10.4) **BMI** = 17.8 (1.9)	*No control group*	(1) To examine the impact of fear of negative evaluation (i.e., predisposing trait) and/or early experiences of involuntary submissiveness (i.e., environmental adversity) in predicting eating disorder symptoms	Interpersonal Needs Questionnaire (INQ) Brief Fear of Negative Evaluation (BFNE)	Eating Disorder Examination Questionnaire (EDE-Q) Early Life Experiences Scale (ELES) The Work and Social Adjustment Scale (WSAS)	(1) Involuntary submissiveness and fear of negative evaluation correlated, and predicted eating disorder symptoms and these associations were partially mediated by perceived lack of social competence
Carter, Kelly, Norwood (2012)	Interpersonal problems in anorexia nervosa: Social inhibition as	AN	Prospective cohort	**Total N** = 618 (97% female) **AN** = 218 **Age =** 26.0 (7.6)	**HCs** = 400	(1) To examine interpersonal problems in AN compared to HCs	Inventory of Interpersonal Problems-32 (IIP-32)	Eating Disorder Examination-Questionnaire (EDE-Q)	(1) Compared with HCs, AN reported higher level of submissiveness, non-assertiveness and social inhibition (2) The above interpersonal problems had a significant positive association

	defining and detrimental			**Duration of illness =** 7.1 years (6.8) **BMI** = 14.8 (1.8)		(2) To determine whether interpersonal problems are related to AN psychopathology (3) To examine change in interpersonal problems following treatment			with eating disorder psychopathology at baseline (3) Levels of submissiveness and non-assertiveness decreased following treatment but not social inhibition
Connan et al., (2007)	Poor Social Comparison and the Tendency to Submissive Behavior in Anorexia Nervosa	AN	Cross-sectional	**Total N** = 47 (100% females) AN = 18 REC = 13 **Age** AN = 26.4 (6.4) REC = 27.4 (4.5) **Duration of illness:** AN = 7.5 REC = 5	HCs = 16 **Age** = 27.5 (4.6)	(1) To compare social rank between AN, REC and HCs	Social Comparison rating scale (SCRS)	Clinical interview schedule (CIS-R) Eating disorders examination questionnaire (EDE-Q) Beck depression inventory (BDI) Beck anxiety inventory (BAI) Childhood Interpersonal Adversity (CIA)	(1) Compared to HCs and REC, AN presented as lower social rank, with characteristics including a tendency to compare themselves unfavourably with others and an increased tendency to submissive behaviour
De Paoli et al., (2017)	Social Rank and Rejection Sensitivity as Mediators of the Relationship between Insecure	AN; BN; BED; OSFED	Cross-sectional	**Total N** = 744 (98% females) AN-R = 56 AN-BP = 17 BN = 17 BED = 10 OSFED = 22	HCs = 622 **Age** = 22.01 (8.63) **BMI** = 22.35 (4.70)	(1) To compare interpersonal rejection sensitivity, appearance-based rejection sensitivity and perception of	Rejection Sensitivity Questionnaire (RSQ) Appearance Based Rejection Sensitivity Scale (ABRSS)	The Eating Disorder Inventory 3 Revised (EDI-3) Experiences in Close	(1) Compared to HCs, ED reported greater interpersonal rejection sensitivity, appearance-based rejection sensitivity and perception of low social rank

	Attachment and Disordered Eating			**Age** = 25.16 (7.60) **BMI** = 20.98 (4.59)		social rank in ED and HCs (2) To examine a new interpersonal model for EDs in which interpersonal rejection sensitivity, appearance-based rejection sensitivity and social rank mediate the relationship between insecure attachment and disordered eating	Social Comparison Rating Scale (SCRS)	Relationships scale (ECR-R)	(2) Interpersonal rejection sensitivity, appearance-based rejection sensitivity and social rank mediated the relationship between insecure attachment and disordered eating
Duarte, Ferreira & Pinto-Gouveia (2016)	At the core of eating disorders: Overvaluation, social rank, self-criticism and shame in anorexia, bulimia and binge eating disorder	AN; BN; BED	Cross-sectional	**N** = 199 (100% females) AN = 34 BN = 34 BED = 51 **Age** AN = 19.85 (4.96) BN = 26.91 (9.23) BED = 38.48 (10.47) **BMI** AN = 16.03 (1.19) BN = 24.94 (7.19) BED = 35.52 (8.10)	*No control group*	(1) To examine the association between social comparison, self-criticism, and eating disorder psychopathology	Other as Shamer Scale (OAS) Forms of Self-Criticizing & Self-Reassuring Scale (FSCRS) Social Comparison through Physical Appearance Scale (SCPAS)	Eating Disorder Examination Questionnaire (EDE-Q) Depression Anxiety and Stress Scales (DASS21)	(1) Unfavourable social comparisons and high levels of self-criticism showed a significant positive association with the severity of eating psychopathology
Hartmann, Zeeck & Barrett (2010)	Interpersonal Problems in Eating Disorders	AN; BN	Prospective cohort	**N =** 208 (94% females) AN-R = 56 AN-BP = 57 BN = 95 **Age** = 24.5 (7.5)	*German normative sample*	(1) To explore the interpersonal patterns evident in patients with eating disorders compared	Inventory of Interpersonal Problems (IIP-C)	Eating Disorder Inventory (EDI) Structured Inventory for Anorexic and	(1) Compared to HCs, the eating disorder sample reported moderate levels of distress in interpersonal functioning and a non-assertive and submissive interpersonal style

				BMI AN-R = 14.6 (1.7) AN-BP = 15.5 (1.6) BN = 22.3 (3.9)		to normal population (2) To examine differences in these patterns across AN-R, BN, or AN-BP (3) To examine change in ED symptoms and interpersonal problems following treatment		Bulimic Syndromes (SIAB-S) Symptom Checklist-90 (SCL-90-R)	(2) No significant differences in interpersonal patterns found between the ED groups (3) Interpersonal distress and non-assertiveness decreased following treatment as well as ED symptoms
Kalayci et al., (2019)	Social functioning and its association with accompanying psychiatric symptoms in adolescents with anorexia nervosa	AN	Cross-sectional	**Total N** = 62 (100% female) AN = 32 **Age** = 15.35 (1.75) **BMI** = 16.6 (1.4)	HCs = 30 **Age** = 15.35 (1.75) **BMI** = 21.3 (1.2)	(1) To examine submissive behaviours, shyness and social comparison in adolescents with AN compared to HCs. (2) To investigate the relationship of social functioning with ED symptoms.	Submissive Acts Scale (SAS) Social Comparison Rating Scale (SCRS)	Eating Attitudes Test-40 (EAT-40) Schedule for Affective Disorders and Schizophrenia for School-Age Children-Present and Lifetime Version (KSADS-PL) Shyness Scale (SS) Beck Depression Inventory (BDI) Screen for Child Anxiety and Related Disorders (SCARED)	(1) Compared to HCs, AN reported higher submissive behaviour scores and shyness scores and lower social comparison scores (2) Submissive behaviours, shyness, and social comparison scores were not related to BMI/EAT scores, the age at the onset of the disease, duration of the disease in the AN group.

								Maudsley Obsessive-Compulsive Inventory (MOCI)	
Ma & Kelly (2020)	The fragility of perceived social rank following exercise in anorexia nervosa: an ecological momentary assessment study of shame and pride	AN	Ecological momentary assessment	**N** = 23 (100% female) **Age** = 21.45 (2.99) **BMI** = 17.86 (1.08)	*No control group*	(1) To examine changes in shame and pride scores: (a) pre physical exercise (b) post physical exercise as times passed	State Shame and Guilt Scale (SSGS)		(1) In the hours before exercise, pride increased, but shame levels did not change significantly (2) Immediately after exercise, pride was higher, and shame lower as compared to later in the day. In the hours after exercise, pride decreased, and body/eating shame increased
Pinto-Gouveia, Ferreira & Duarte (2014)	Thinness in the Pursuit for Social Safeness: An Integrative Model of Social Rank Mentality to Explain Eating Psychopathology	AN; BN; EDNOS	Cross-sectional	**Total N** = 225 (100% female) AN-R = 23 AN-BP = 10 BN = 31 EDNOS = 38 **Age** = 23.62 (7.42) **BMI** AN = 16.02 (1.21) BN = 25.83 (7.88) EDNOS = 21.80 (6.10)	HCs = 123 **Age** = 23.54 (6.89) **BMI** = 21.95 (3.19)	(1) To examine the Relationship between Social Rank, social comparison, insecure strivings and eating psychopathology variables	Striving to Avoid Inferiority Scale (SAIS) Social Comparison through Physical Appearance Scale (SCPAS) Other as Shamer Scale (OSS)	Eating Disorder Inventory (EDI) Eating Disorder Examination Questionnaire (EDE-Q) The Forms of Self-Criticizing and Self-Reassuring Scale (FSCRS) Self-Compassion Scale (SCS)	(1) Low social rank and insecure strivings, correlated significantly with concern about eating, body image dissatisfaction and drive for thinness
Troop et al., (2003)	Social comparison and submissive behaviour in eating disorder patients	AN; BN; EDNOS	Cross-sectional	**Total N** = 202 (93% female) AN-R = 23 AN-BP = 15 BN = 51 EDNOS = 12	HCs = 101 **Age** = 26.7 (7.7)	(1) To explore: (a) the perceived social comparison and submissive behaviour in ED compared to HCs	Social Comparison Rating Scale (SCRS) Submissive Behaviour Scale (SBS)	Eating Disorders Inventory (EDI) Symptom Checklist (SCL-90-R)	(1) Compared to HCs, ED showed lower social rank and higher submissive behaviour (2) Social rank perception and submissive behaviour significantly correlated with ED symptoms

				Age AN-R = 21.6 (4.6) AN-BP = 27.3 (9.1) BN = 28.5 (7.2) EDNOS = 26.6 (10.8) **BMI** AN-R = 16.3 (3.9) AN-BP = 17.3 (1.9) BN = 24.6 (9.1) EDNOS = 22.8 (4.7)		(b) the correlation between social comparison and submissive behaviour and ED symptoms.			
Troop et al., (2014)	Social Rank and Symptom Change in Eating Disorders: A 6-month Longitudinal Study	AN; BN	Cross-sectional	**N** = 73 (96% female) **Age** = 35.5 (9.9) **BMI** = 19.7 (5.5)	*No control group*	(1) To identify the predictive value of social rank to changes in eating disorder symptoms in a longitudinal study.	Social Comparison Rating Scale (SCRS) Submissive Behaviour Scale (SBS) Social Defeat Scale (SDS)	Short Evaluation of Eating Disorder (SEED) Beck Depression Inventory-IA (BDI-IA) Internal–External Entrapment Scale (IEE)	(1) Higher perceived social rank was not associated with a decrease in symptoms of anorexia at follow-up; rather, lower perceived social rank was associated with an increase in anorexic symptoms at follow-up

Notes
N: number of participants; BMI: body mass index; AN: anorexia nervosa; AN-R: anorexia nervosa restrictive type; AN-BP: anorexia nervosa binge-purging type; BED: binge eating disorder; EDNOS: eating disorder not otherwise specified; HCs: healthy control group; REC: recovered eating control.

3.2 Quality of studies

Overall quality ratings of the studies are displayed in table 2. One study (6.25%) was rated as methodologically *poor*, 4 studies (25%) as *fair*, and 11 studies (68.75%) as *good*. Studies that received a quality rating of *good* were likely to be those that employed a more robust design (i.e. prospective cohort) and in which the exposure(s) of interest were measured prior to the outcome(s) being measured, the timeframe was sufficient to reasonably expect to see an association between exposure and outcome if it existed, and the exposure(s) were assessed more than once over time (i.e. follow-up). For the cross-sectional design studies, these criteria were not applicable due to the nature of the design; these studies were likely to receive a *good* rating if all the subjects were selected or recruited from the same or similar populations, and they controlled for key confounding variables. Studies more likely to be assigned a *fair* rating tended to fail to meet more than one of the above-mentioned criteria, mainly selecting or recruiting all subjects from the same or similar populations. Overall, most of the studies did not report if the participation rate of eligible participants was at least 50% (criteria 3) and failed to provide a sample size justification (criteria 5). For all the studies, criteria 8, which related to exposures that can vary in amount or level, was not applicable.

Table 2. Quality Assessment ratings

Study	1. Was the research question or objective in this paper clearly stated?	2. Was the study population clearly specified and defined?	3. Was the participation rate of eligible persons at least 50%?	4. Were all the subjects selected or recruited from the same or similar populations (including the same time period)? Were inclusion and exclusion criteria for being in the study prespecified and applied uniformly to all participants?	5. Was a sample size justification, power description, or variance and effect estimates provided?	6. For the analyses in this paper, were the exposure(s) of interest measured prior to the outcome(s) being measured?	7. Was the timeframe sufficient so that one could reasonably expect to see an association between exposure and outcome if it existed?	8. For exposures that can vary in amount or level, did the study examine different levels of the exposure as related to the outcome (e.g., categories of exposure, or exposure measured as continuous variable)?	9. Were the exposure measures (independent variables) clearly defined, valid, reliable, and implemented consistently across all study participants?	10. Was the exposure(s) assessed more than once over time?	11. Were the outcome measures (dependent variables) clearly defined, valid, reliable, and implemented consistently across all study participants?	12. Were the outcome assessors blinded to the exposure status of participants?	13. Was loss to follow-up after baseline 20% or less?	14. Were key potential confounding variables measured and adjusted statistically for their impact on the relationship between exposure(s) and outcome(s)?	**TOTAL RATING**
Ambwani et al., (2016)	YES	YES	CD	NO	NO	NO	NO	NA	YES	NA	YES	NA	NA	YES	**FAIR**
Blomquist et al., (2012)	YES	YES	CD	YES	NO	NO	NO	NA	YES	NA	YES	NA	NA	YES	**GOOD**
Brugnera et al., (2018)	YES	YES	CD	NO	NO	NO	NO	NA	YES	NA	YES	NA	NA	NO	**POOR**
Brugnera et al., (2019)	YES	YES	CD	NO	NO	YES	YES	NA	YES	YES	YES	NA	NO	NO	**GOOD**
Cardi et al. (2014)	YES	YES	CD	YES	NO	NO	NO	NA	YES	NA	YES	NA	NA	YES	**GOOD**
Cardi et al. (2018)	YES	YES	YES	YES	NO	NO	NO	NA	YES	NA	YES	NA	NA	NO	**GOOD**
Carter, Kelly & Norwood (2012)	YES	YES	CD	YES	NO	NO	YES	NA	YES	YES	YES	NA	CD	YES	**GOOD**
Connan et al., (2007)	YES	YES	NO	NO	NO	NO	NO	NA	YES	NA	YES	NA	NA	YES	**FAIR**
De Paoli et al., (2017)	YES	YES	CD	NO	NO	NO	NO	NA	YES	NA	YES	NA	NA	YES	**FAIR**

Duarte, Ferreira & Pinto-Gouveia (2016)	YES	YES	CD	YES	NO	NO	NO	NA	YES	NA	YES	YES	NA	YES	**GOOD**
Hartmann, Zeeck & Barrett (2010)	YES	YES	CD	YES	NO	YES	YES	NA	YES	YES	YES	NA	NR	YES	**GOOD**
Kalayci (2019)	YES	YES	YES	NO	NO	NO	NO	NA	YES	NO	YES	NA	NA	YES	**GOOD**
Ma & Kelly (2020)	YES	YES	YES	YES	NO	YES	YES	NA	YES	YES	YES	NA	YES	NO	**GOOD**
Pinto-Gouveia, Ferreira & Duarte (2014)	YES	YES	CD	NO	NO	NO	NO	NA	YES	NA	YES	NA	NA	YES	**FAIR**
Troop (2003)	YES	YES	YES	YES	NO	NO	NO	NA	YES	NA	YES	NA	NA	YES	**GOOD**
Troop (2014)	YES	NO	YES	YES	NO	NO	YES	NA	YES	YES	YES	NA	NA	YES	**GOOD**

CD, cannot determine; NA, not applicable; NR, not reported

3.3 Synthesis of findings

Overall, findings from the studies strongly supported the hypotheses postulated by the current review: (1) individuals with EDs tended to perceive themselves as lower social rank compared to healthy controls and they presented with characteristic features of low social rank (e.g. submissiveness, inferiority, shame); additionally, (2) the perception of being of low social rank was significantly associated with more severe ED psychopathology. Table 3 below provides a visual representation of whether the findings from each study supported the hypotheses. A more detailed discussion of the findings is provided in the following sections.

Table 3. Visual representation of whether the findings from each study supported the hypotheses postulated by the current review

Study	**Hypothesis 1 -** individuals with eating disorders will perceive themselves as lower social rank compared to healthy controls AND/OR they will present high levels of submissiveness, non-assertiveness, rejection sensitivity, and shame	**Hypothesis 2 -** low social rank and related characteristics (e.g. submissiveness, non-assertiveness, exploitability) will show a positive correlation with eating disorder psychopathology
Ambwani et al., (2016)	✓	**NA**
Blomquist et al., (2012)	✓	✓
Brugnera et al., (2018)	✓	✓
Brugnera et al., (2019)	✓	**NA**
Cardi et al. (2014)	✓	✓
Cardi et al. (2018)	**NA**	✓
Carter, Kelly & Norwood (2012)	✓	✓
Connan et al., (2007)	✓	**NA**
De Paoli et al., (2017)	✓	**NA**
Duarte, Ferreira & Pinto-Gouveia (2016)	**NA**	✓
Hartmann, Zeeck & Barrett (2010)	✓	**NA**
Kalayci (2019)	✓	✗
Ma & Kelly (2020)	**NA**	✓
Pinto-Gouveia, Ferreira & Duarte (2014)	**NA**	✓
Troop (2003(	✓	✓

Troop (2014)	**NA**	✓

3.3.1 How do people with eating disorders perceive themselves in the social hierarchy compared to healthy controls? What are the characteristics related to social rank found within individuals with EDs?

Social rank

Five studies directly examined the perception of social rank, as measured with the gold-standard measure of the Social Comparison Rating Scale (Allan & Gilbert, 1995), by comparing an ED group to a healthy control group (Cardi et al., 2014; Connan et al., 2007; De Paoli et al., 2017; Kalayci et al., 2019; Troop et al., 2003).

Cardi and colleagues (2014) compared scores on the self-reported measure of social rank between ED participants, recovered ED participants (RECs) and healthy controls (HCs). The ED group reported significantly lower perception of social rank compared to the other groups. Consistent results were also reported by Connan et al. (2007), who assessed and compared perception of social rank between EDs (AN), RECs and HCs, and also showed that REC reported lower scores on measures of social rank compared to the HCs. Studies by De Paoli et al. (2017), Kalayci et al. (2019) and Troop et al. (2013) provided further support to the findings that people with EDs, either AN or BN, perceive themselves as low on the social hierarchy compared to HCs, suggesting that it might be a trait vulnerability factor for the disorders.

Several studies assessed the cognitive, affective and interpersonal correlates of low social rank (e.g. submissiveness, non-assertiveness, shame, rejection sensitivity) in samples of ED participants (Ambwani et al., 2016; Blomquist et al., 2012; Brugnera et al., 2018; 2019; Cardi et al., 2014; Carter, Kelly & Norwood, 2012; Connan et al., 2007; De Paoli et al., 2017; Hartmann et al., 2010). These findings are reported in the sections below.

Submissiveness and Non-assertiveness

Several studies used the Inventory of Interpersonal Problem (IIP; Horowitz et al., 1988; 2000) to assess interpersonal problems and interpersonal style in EDs and compared it to a HCs (Ambwani et al., 2016; Blomquist et al., 2012; Brugnera et al., 2018; 2019; Carter, Kelly & Norwood, 2012; Hartmann, Zeeck & Barrett, 2010). Overall, these studies suggested that individuals with EDs, regardless of the specific ED diagnosis, presented higher rates of friendly-submissive and non-assertive interpersonal profiles compared to HCs. Additionally, the EDs participants reported interpersonal problems such as non-assertiveness, exploitability, and being overly-nurturant

(Ambwani et al., 2016; Blomquist et al., 2012; Brugnera et al., 2018; 2019; Carter, Kelly & Norwood, 2012; Hartmann, Zeeck & Barrett, 2010; Ung et al., 2017). For instance, Ambwani and colleagues (2016) experimentally assessed interpersonal perceptions and their anticipated social-behavioural sequelae among women with AN or OSFED and a HC group. Findings showed that AN participants tended to perceive interpersonal interactions with others as colder and perceived other people as more dominant than the HC respondents. They also selected cold-submissive responses more frequently than HCs. Carter, Kelly and Norwood (2012) employed a prospective cohort design to assess changes in interpersonal style following treatment in a sample of AN. Their results suggested that levels of submissiveness and non-assertiveness decreased following treatment but not social inhibition. Similarly, Hartmann, Zeeck and Barrett (2010) showed that interpersonal distress and non-assertiveness decreased following treatment in a sample of AN and BN.

Three studies specifically examined interpersonal style and difficulties in Binge Eating Disorder (Blomquist et al., 2012; Brugnera et al., 2018; 2019). Brugnera and colleagues (2018; 2019) compared BED with obese and HCs and found that the BED group reported significantly higher non-assertive and exploitable styles compared to the other two groups, suggesting that this is an interpersonal style characteristic of BED and not of obese populations. Brugnera et al. (2019) also tested whether interpersonal problems changed following a course of psychodynamic–interpersonal psychotherapy (GPIP) at 12 months post-GPIP. Results showed that the intensity of non-assertive interpersonal problems of patients with BED decreased post-group treatment, but their profiles remained prototypically non-assertive and exploitable across all time points. Similarly, Blomquist et al. (2012) showed that individuals with BED tended to have a friendly-submissive interpersonal style and to show attempts to please others and win their approval through overly accommodating and non-assertive behaviours. Tendency to submissive behaviour was also reported in AN, whereby Connan et al. (2007) found higher levels of submissiveness in the AN sample compared to REC and HCs.

Altogether these studies suggest that friendly-submissive and non-assertive interpersonal profiles are consistently found across all EDs, with different treatment approaches having a positive impact on these interpersonal difficulties.

Cognitive biases to social rank cues

Cardi and colleagues (2014) reported findings that individuals with EDss showed a biased processing of social stimuli (i.e. heightened vigilance to social rank cues). This was measured with a behavioural task requiring participants to respond to a probe stimulus that was initially hidden from view behind one of two stimuli. Participants had to respond to stimuli consisting of eight grey-scale pictures of faces of different people (male and female) providing neutral and dominant poses and neutral and submissive poses (Posner et al., 1980). A fast reaction time (RT) was indicative that attention had been directed to the stimulus that obscured the probe. This processing of social stimuli in the ED group differed from the HCs: ED and REC showed increased vigilance toward rank-related stimuli whereas the HCs showed attentional disengagement from these social-rank stimuli and vigilance toward neutral faces.

Attachment style and rejection sensitivity

De Paoli and colleagues (2017) examined attachment style and rejection sensitivity in relation to social rank. Findings suggested that the EDs participants reported significantly higher levels of insecure attachment (both anxious and avoidant) as well as greater interpersonal rejection sensitivity compared with HCs, alongside perceptions of low social rank.

Shame and Insecurity strivings

Other components indicative of perceptions of low social rank, namely shame and insecurity strivings, are reported in Cardi' et al. (2014) and Pinto Gouveia et al.' (2014) studies. The first study showed that EDs reported higher levels of shame as well as unfavourable social comparison compared to HCs (Cardi et al., 2014). In the second study, Pinto Gouveia and colleagues (2014) tested a model based on social rank mentality in a sample of participants with AN, BN and EDNOS, and they found evidence of a strong association between perceptions of being in an inferior social rank position, shame, and the need to compete to avoid inferiority (i.e. insecure striving).

3.3.2 What is the association between perceived social rank and related constructs, and eating disorder psychopathology?

The association between perception of social rank and related constructs (i.e. submissiveness, non-assertiveness, shame, inferiority) and ED symptomatology was examined in several studies included in the current review (N = 11) (Blomquist et al., 2012; Brugnera et al., 2018; Cardi et al., 2014; 2018; Carter, Kelly & Norwood, 2012; Duarte, Ferreira & Pinto-Gouveia, 2016; Kalayci et al., 2019; Ma & Kelly, 2020; Pinto-Gouveia, Ferreira & Duarte, 2014; Troop et al., 2003; 2014). Overall, findings from these studies showed that these constructs significantly correlated with ED symptoms and typical features of the disorders.

In a 6-month longitudinal study, Troop et al. (2014) examined whether social rank predicted anorexic and bulimic symptoms. Results showed that low social rank predicted an increase in anorexic but not bulimic symptoms over 6 months; however, higher perceived social rank at follow-up compared to baseline was not related with a decrease in anorexic symptoms.

Cardi and colleagues (2014; 2018) provided further evidence for an association between social rank and ED symptoms in two studies: in the first one, they showed that negative self-evaluation significantly predicted eating disorder symptoms as measured with the Eating Disorder Examination Questionnaire; similarly, in the second study, it was found that submissiveness and fear of negative evaluation predicted eating disorder symptoms.

Carter et al. (2012) found that higher submissiveness and non-assertiveness showed a significant positive correlation with ED psychopathology in a sample of AN participants. Troop and colleagues (2003) showed an association between low social rank and high submissive behaviour with ED symptoms, even after controlling for other psychiatric symptoms (i.e. depression). In line with this, Duarte, Ferreira and Pinto-Gouveia (2016) reported that the severity of eating psychopathology was significantly associated with social rank, with no difference between AN, BN, and BED.

Two studies specifically examined social rank in relation to BED symptoms (Blomquist et al., 2012; Brugnera et al., 2018). Interpersonal styles were examined in relation to the developmental trajectories of BED, showing that submissiveness was linked with younger age of onset of overweight, dieting and first binge, as well as younger age of meeting BED criteria (Blomquist et al., 2012). However, no interpersonal variable was significantly correlated with BMI (Blomquist et al., 2012). Brugnera et al. (2018) provided further support for an association between a friendly-submissive interpersonal style and binge eating severity as measured by the Binge Eating Severity questionnaire.

Ma and Kelly (2020) adopted an ecological momentary assessment design. Based on the rationale that weight-control behaviours may offer a momentary sense of increased social rank via heightened pride and decreased shame, they found that pride was high immediately after exercise, but showed a decreasing trend in the subsequent hours and shame was typically low immediately after exercise but showed an increasing trend in the hours after. This could potentially explain the high level of physical activity characteristic of some ED conditions.

Lastly, Pinto Gouveia and colleagues (2014) showed that perceptions of low social rank, as well as related constructs, namely inferiority feelings and insecure strivings, correlated significantly with concern about eating, body image dissatisfaction and drive for thinness.

The only study which reported results that are in contrast with the ones reported above is Kalayci et al. (2019) who found that social comparison and submissive behaviour scores were not related to BMI, age of onset of the disease and duration of the disease in the AN group.

4. Discussion

This systematic review aimed to identify, evaluate and synthesise existing literature exploring the relationship between social rank and EDs. It aimed to examine how individuals with EDs perceive their social rank compared to others and the relationship between social rank and ED psychopathology. It was expected that individuals with EDs would perceive their social rank as lower compared to healthy controls and that low social rank would show a significant positive correlation with ED psychopathology. To date, this was the first systematic review on social rank and EDs.

This review has drawn together 16 studies which were examined to answer the above research questions.

Summary of findings

Overall, 11 of the 16 studies included examined perceptions of social rank and the related cognitive, affective and interpersonal features across different samples of participants with ED, with most of the studies including a healthy control group. Findings strongly supported the first hypothesis that individuals with eating disorders perceived their social rank as lower compared to healthy controls (Ambwani et al., 2016; Blomquist et al., 2012; Brugnera et al., 2018; 2019; Cardi et al., 2014; Carter, Kelly & Norwood, 2012; Connan et al., 2007; De Paoli et al., 2017; Hartmann, Zeeck & Barrett, 2010; Kalayci et al., 2019; Troop et al., 2003). The social rank system promotes social comparisons as a way of appraising one's relative rank, and individuals consider themselves to be high or low social rank on the basis of how they perceive that others perceive them. According to the findings collated in the current review, there is consistent evidence that individuals with eating disorder systematically perceive themselves as being of lower social rank compared to others, who are perceived as more powerful. All the studies that tested this association reported results in this expected direction. Interestingly, this perception of low social rank seems to apply to all EDs regardless of the specific diagnosis, potentially constituting a transdiagnostic trait characteristic of EDs (Ambwani et al., 2016; Blomquist et al., 2012; Brugnera et al., 2018; 2019; Carter, Kelly & Norwood, 2012; Hartmann, Zeeck & Barrett, 2010). This is consistent with the different forms of EDs having many common features and individuals often moving between the various DSM-V categories or meeting criteria for EDNOS.

Further on this line, findings supported the first hypothesis that individuals with ED would show high levels of the cognitive, affective and interpersonal correlates of low social rank (Ambwani et al., 2016; Blomquist et al., 2012; Brugnera et al., 2018; 2019; Cardi et al., 2014; Carter, Kelly & Norwood, 2012; Connan et al., 2007; De Paoli et al., 2017; Hartmann et al., 2010). It was consistently found that ED participants presented friendly-submissive and non-assertive interpersonal profiles and tended to be non-assertiveness, accommodating and exploitable in their interactions with others. Given their perceptions of being low social rank, individuals experience high levels of interpersonal distress and fear rejection from others, wanting to avoid conflict, competition and rivalry in attempts to avoid unfavourable social comparison, and feelings of inferiority and shame (De Paoli et al., 2017; Pinto-Gouveia, Ferreira & Duarte, 2014).

Eleven studies examined the association between perception of social rank and eating disorder symptomatology (Blomquist et al., 2012; Brugnera et al., 2018; Cardi et al., 2014; 2018; Carter, Kelly & Norwood, 2012; Duarte, Ferreira & Pinto-Gouveia, 2016; Kalayci et al., 2019; Ma & Kelly, 2020; Pinto-Gouveia, Ferreira & Duarte, 2014; Troop et al., 2003; 2014). Overall, the majority of studies supported the second hypothesis by showing that low social rank significantly correlated with eating disorders symptoms. Regardless of the ED diagnosis, individuals who perceived themselves as being of low social rank or experiencing high levels of submissiveness, non-assertiveness, inferiority feelings and insecure strivings presented with a more severe ED psychopathology. It could be argued that ED symptoms might have the function of restoring or maintaining social rank: people with ED might try to alter their physical appearance to be more attractive, approved and accepted by others (Troop et al., 2003, 2014). They are highly concerned with their weight and shape and engage in severe eating restriction or compensatory behaviours as this seems their only alternative to gain high social rank. This is consistent with findings that individuals with EDs, especially with more severe or persistent forms of the disorder, base their identity, self-concept and self-esteem solely on the ED, at the expense of other areas of their lives (e.g. work, social life). ED symptoms might be used as a way of coping with the difficult emotions arising from perceiving oneself as low social rank (e.g. shame, inferiority) and generate a sense of achievement, pride and short-lasting positive emotions (Duarte et al., 2006; Schmidt & Treasure, 2006). Individuals might feel special as a consequence of their symptoms (Schmidt & Treasure, 2006). Given their difficulties with assertiveness and submissiveness, it is also possible that ED symptoms may have the function of communicating certain needs, without having to communicate these needs directly to other people (Carter, Kelly & Norwood, 2012).

According to the findings collated in the current review, some of the low social rank features could be considered trait vulnerability factors for eating disorders. In fact, the studies that included a group of recovered individuals showed that the REC sample reported lower perception of social rank compared to healthy controls as well as higher levels of submissiveness and non-assertiveness, and increased vigilance towards rank-related stimuli (Cardi et al., 2004; Connan et al., 2007). However, these are initial findings, and the mechanistic role that social rank may have in the aetiology and/or maintenance of the disorder remains to be clarified. Future longitudinal studies have the potential to shed light on whether these interpersonal difficulties are intrinsic trait vulnerabilities which make individuals more likely to develop an ED or whether they are the unavoidable consequence of a disorder which drains all the interpersonal qualities of individuals suffering from it.

The only study which reported results which were not in line with the one presented above is a study by Kalayci and colleagues (2019) on adolescents with AN. Female adolescents with AN had a higher level of submissive behaviours, a sense of inadequacy and negative self-perceptions in their social relationships compared to HCs; however, social comparison and submissive behaviour scores were not related to BMI, age of onset of the disease and duration of the disease. It is important to note that this is the only study which examined social rank in a sample of adolescents. These findings suggest that such interpersonal difficulties might be important in the development and/or maintenance of AN, but other factors are likely be key in determining age of onset and BMI. Additionally, the variance in age of onset and duration within this constrained younger sample is likely to be lower. Nevertheless, this highlights the importance of more longitudinal research to shed light on the role of social rank in the onset and maintenance of EDs.

Overall, cross-sectional studies all indicated the possible role of social rank in the aetiology (either the onset or the maintenance) of eating disorder symptoms. There were only a few longitudinal studies which explored the predictive value of social rank to changes in ED symptoms. One of these studies is the one carried out by Troop and colleagues which corroborated cross-sectional results on the role of social rank in EDs, and also showed that low social rank predicted an increase in symptoms of AN over 6 months. However, social rank was not predictive of an increase in BN symptoms, suggesting that its role might be specific to symptoms of AN rather than BN (Troop et al., 2014). Interestingly, the study also showed that a slight increase in perception of social rank was not related with a decrease in anorexic symptoms. This finding is not surprising as symptoms of AN are part of a complex multifactorial aetiology and maintenance picture, that involves the interaction of biological, psychological, social, and familial factors (Szmukler, Dare, & Treasure, 1995). It is possible that a decrease in social rank is accompanied by a decline in other social and emotional aspects, which altogether result in symptoms deterioration. However, a small increase in social rank might not be strong enough to result in symptom improvement (Troop et al., 2014).

Other studies which employed a prospective design were Carter, Kelly and Norwood (2012) and Hartmann, Zeeck & Barrett (2010). These studies showed that interpersonal difficulties such as non-assertiveness and interpersonal distress decreased following treatment as well as ED symptoms. However, they did not examine the predictive value of social rank in explaining changes in ED symptoms.

Clinical implications

The findings summarised in the current systematic review have important clinical implications.

Firstly, they highlight the relevance and role of social rank in the EDs field. This adds to the growing interest in the role of interpersonal difficulties in the aetiology, maintenance and treatment of EDs, suggesting the importance of considering social rank and the related cognitive, affective and interpersonal correlates of it. Most of the studies included in the current review are cross-sectional, therefore, there is lack of definitive evidence about causation. However, interpersonal difficulties could be a trait-vulnerability factor for EDs and could be considered at the heart of ED symptomatology, with the function of restoring or maintaining social rank, as well as coping with the difficult emotions arising from perceiving oneself as low social rank and generate a sense of achievement.

Importantly, the current review has highlighted that social rank is relevant to all the different types of EDs. Therefore, this could set the ground for developing transdiagnostic approaches and treatments, which could be applied to all EDs in a cost-effective manner (Duarte, Ferreira & Pinto-Gouveia, 2016).

Given this role of social rank, interpersonal treatments for ED aimed at reducing eating disorder pathology by improving interpersonal functioning could be important. The current findings may inform existing therapies such as Interpersonal Psychotherapy for EDs (Rieger et al., 2010) and Cognitive Behaviour Therapy for EDs (CBT-E; Fairburn, 2008) in supporting individuals challenging negative automatic thoughts associated with social rank as well as finding alternative contexts in which to achieve status (De Paoli et al., 2017; Troop et al., 2014). Supporting individuals finding personal qualities and skills as well as successful areas of their lives that go beyond the ED could be helpful to improve their rank perception and challenge the role of the ED. This should go alongside a recognition of the potential contribution of environmental factors, such as childhood experiences or traumatic experiences, in the development of low social rank mentality and maintenance of the disorder.

Additionally, improving individuals' ability to be more assertive and dominant in interpersonal relationship may also be very important (Blomquist et al., 2012; Brugnera et al., 2018). An assertive interpersonal style is at the heart of positive and healthy interpersonal relationship and to meet one own's needs. Novel relational and interpersonal frameworks using digital technologies, such as AVATAR therapy, could be applied in ED to improve individuals' ability to be assertive and confident in interactions with others as well as towards the disorder (Craig et al., 2017). Work is underway in conducting a small initial feasibility and acceptability trial to apply AVATAR therapy to patients with

AN. This work involves challenging and gaining power over the ED voice as well as assertiveness training and work on self-esteem and personal values.

Approaches aimed to increase self-compassion and improve emotion regulation difficulties such as Compassion-Focused Therapy may also be relevant for EDs (Goss & Allan, 2010; Gale, Gilbert, Read, & Goss, 2014). As suggested by the current findings, people with EDs experience a sense of the self as being flawed, inadequate, inferior, powerless, and unattractive. They experience high levels of self-criticism, self-directed hostility, low self-esteem and shame. Furthermore, these individuals tend to have difficulties generating and activating affiliative and self-soothing emotions to cope with difficult emotions, but instead they use ED behaviours to cope with them. Compassion-Focused Therapy can help individuals approaching oneself with kindness and acceptance, especially in the face of one's own personal distress or disappointments, and to self-regulate in an adaptive way (Gilbert, 2014; Goss & Allan, 2010).

Research implications

The current review has important research implications and brings forward several questions that future studies should explore. Firstly, further prospective research is needed to examine the timing and sequencing of social rank mentality and disordered eating development and on the development and maintenance of ED. It would be important to consider the question of whether social rank is a potential trait vulnerability factors that makes individuals more likely to develop an ED. In contrast, it could be that low social rank and related features develop as a consequence of the disorder. Another important question that needs to be further explored is whether social rank difficulties constituting a transdiagnostic trait characteristic of EDs as suggested by many studies involved in the current review. In contrast, there might also be some disorder specific findings (Troop, 2004) which suggest that there might be some aspects of social rank that are more relevant to some forms of EDs that others.

More research is also needed to understand the potential role of social ranking variables on therapeutic outcomes and relapse rates as well as to explore the predictive value of social rank in symptom change. Given the interpersonal role of social rank, future studies could explore how it impacts on therapy engagement and the therapeutic relationship. Additionally, although there is notable research on the role of social comparison, shame, non-assertiveness, submissiveness, and striving to avoid inferiority in eating disordered behaviour, no study had yet integrated such aspects within a comprehensive model.

Conclusion

In summary, this review has shown that individuals with EDs perceive their social rank as lower compared to healthy controls and present cognitive, affective and interpersonal correlates of low social rank such as high levels of submissiveness, non-assertiveness, exploitability, rejection sensitivity, and feelings of shame and inferiority. Such perceptions of low social rank and related characteristics have a strong positive significant correlation with ED psychopathology, regardless of the ED diagnosis. More longitudinal and retrospective studies are need to shed light on the role of perceived social rank in the aetiology and maintenance of ED symptoms. This review has added valuable information for our understanding of the complex and intricated aetiology of ED and highlighted clinical implications for improving the treatment offered to those suffering from the conditions.

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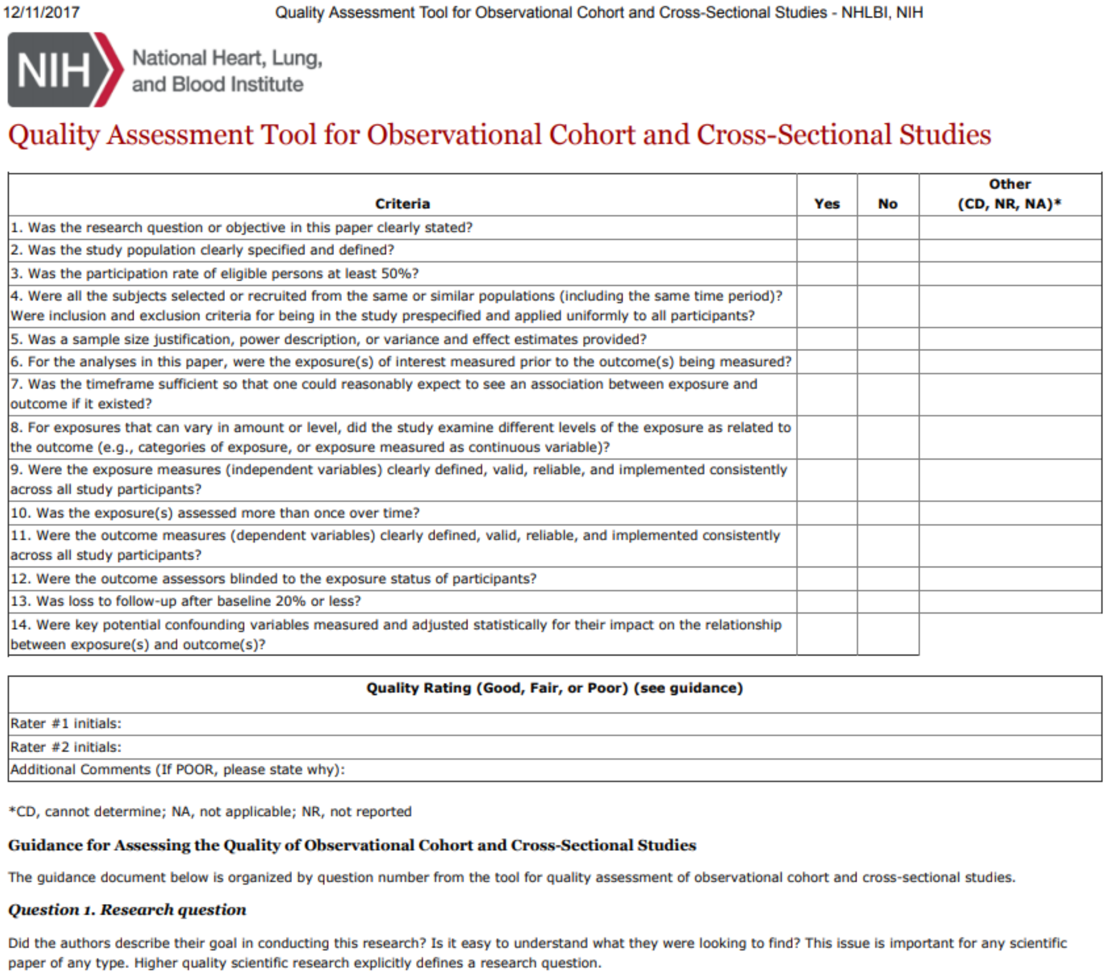
6. Appendices

Appendix A – Quality Assessment Tool for Observational Cohort and Cross-Sectional Studies



12/11/2017 Quality Assessment Tool for Observational Cohort and Cross-Sectional Studies - NHLBI, NIH

NIH National Heart, Lung, and Blood Institute

Quality Assessment Tool for Observational Cohort and Cross-Sectional Studies

Criteria	Yes	No	Other (CD, NR, NA)*
1. Was the research question or objective in this paper clearly stated?			
2. Was the study population clearly specified and defined?			
3. Was the participation rate of eligible persons at least 50%?			
4. Were all the subjects selected or recruited from the same or similar populations (including the same time period)? Were inclusion and exclusion criteria for being in the study prespecified and applied uniformly to all participants?			
5. Was a sample size justification, power description, or variance and effect estimates provided?			
6. For the analyses in this paper, were the exposure(s) of interest measured prior to the outcome(s) being measured?			
7. Was the timeframe sufficient so that one could reasonably expect to see an association between exposure and outcome if it existed?			
8. For exposures that can vary in amount or level, did the study examine different levels of the exposure as related to the outcome (e.g., categories of exposure, or exposure measured as continuous variable)?			
9. Were the exposure measures (independent variables) clearly defined, valid, reliable, and implemented consistently across all study participants?			
10. Was the exposure(s) assessed more than once over time?			
11. Were the outcome measures (dependent variables) clearly defined, valid, reliable, and implemented consistently across all study participants?			
12. Were the outcome assessors blinded to the exposure status of participants?			
13. Was loss to follow-up after baseline 20% or less?			
14. Were key potential confounding variables measured and adjusted statistically for their impact on the relationship between exposure(s) and outcome(s)?			

Quality Rating (Good, Fair, or Poor) (see guidance)
Rater #1 initials:
Rater #2 initials:
Additional Comments (If POOR, please state why):

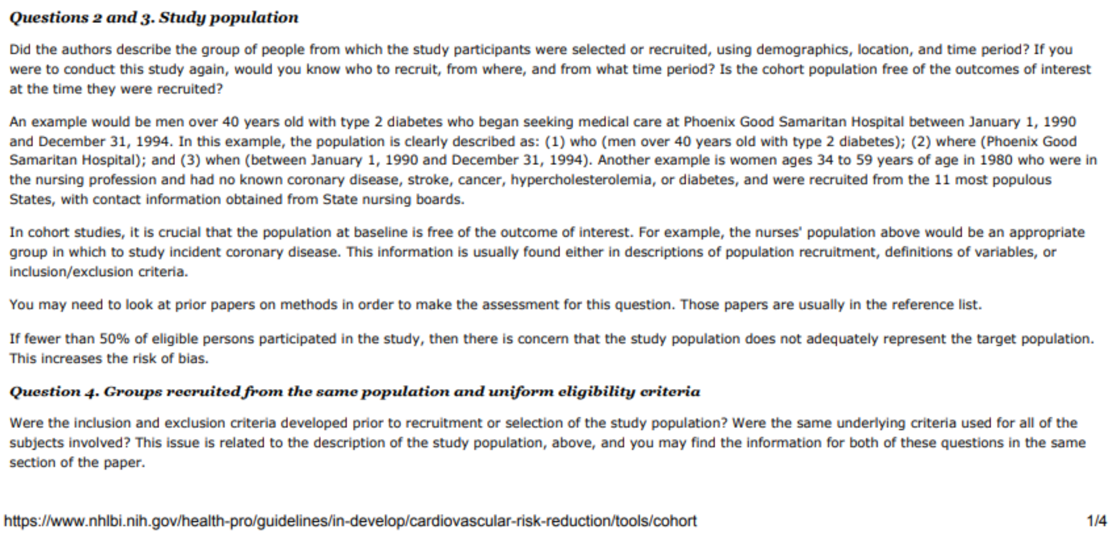
*CD, cannot determine; NA, not applicable; NR, not reported

Guidance for Assessing the Quality of Observational Cohort and Cross-Sectional Studies

The guidance document below is organized by question number from the tool for quality assessment of observational cohort and cross-sectional studies.

Question 1. Research question

Did the authors describe their goal in conducting this research? Is it easy to understand what they were looking to find? This issue is important for any scientific paper of any type. Higher quality scientific research explicitly defines a research question.



Questions 2 and 3. Study population

Did the authors describe the group of people from which the study participants were selected or recruited, using demographics, location, and time period? If you were to conduct this study again, would you know who to recruit, from where, and from what time period? Is the cohort population free of the outcomes of interest at the time they were recruited?

An example would be men over 40 years old with type 2 diabetes who began seeking medical care at Phoenix Good Samaritan Hospital between January 1, 1990 and December 31, 1994. In this example, the population is clearly described as: (1) who (men over 40 years old with type 2 diabetes); (2) where (Phoenix Good Samaritan Hospital); and (3) when (between January 1, 1990 and December 31, 1994). Another example is women ages 34 to 59 years of age in 1980 who were in the nursing profession and had no known coronary disease, stroke, cancer, hypercholesterolemia, or diabetes, and were recruited from the 11 most populous States, with contact information obtained from State nursing boards.

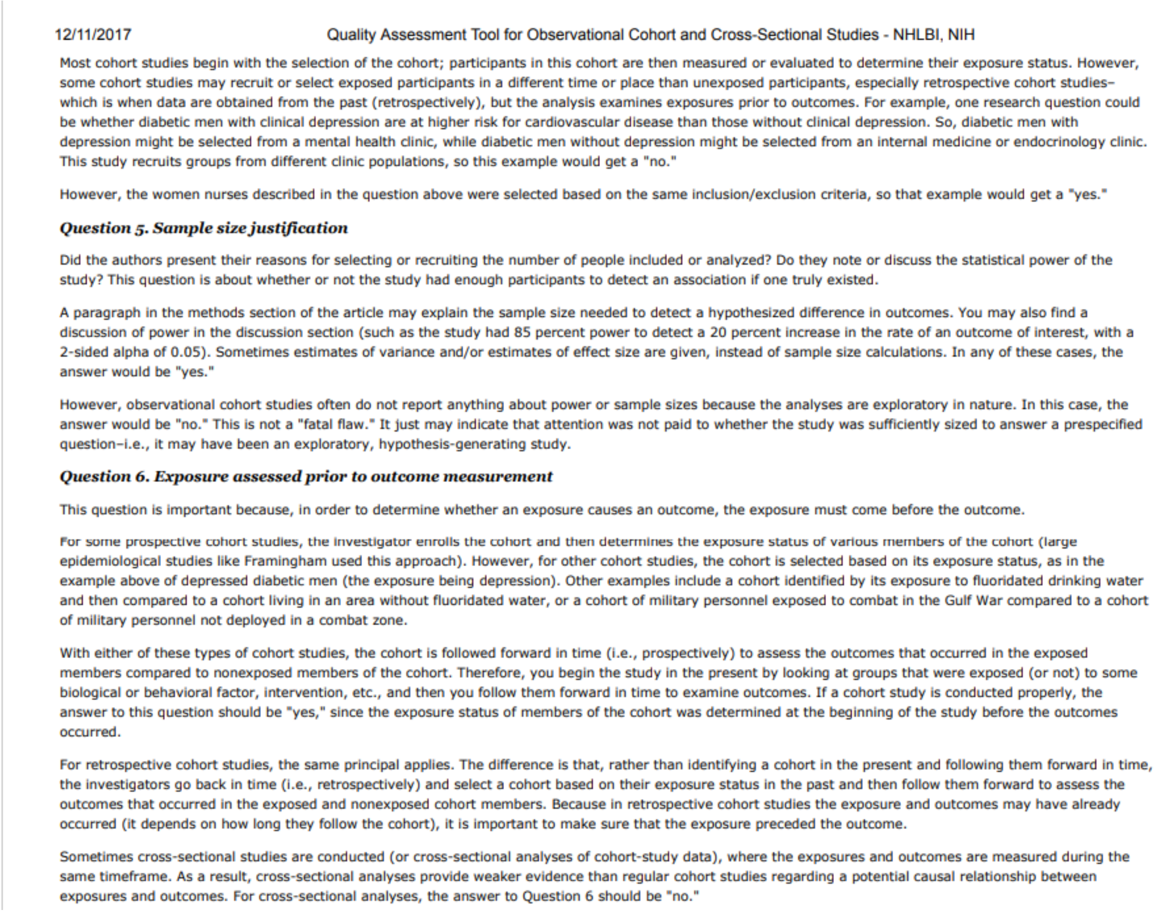
In cohort studies, it is crucial that the population at baseline is free of the outcome of interest. For example, the nurses' population above would be an appropriate group in which to study incident coronary disease. This information is usually found either in descriptions of population recruitment, definitions of variables, or inclusion/exclusion criteria.

You may need to look at prior papers on methods in order to make the assessment for this question. Those papers are usually in the reference list.

If fewer than 50% of eligible persons participated in the study, then there is concern that the study population does not adequately represent the target population. This increases the risk of bias.

Question 4. Groups recruited from the same population and uniform eligibility criteria

Were the inclusion and exclusion criteria developed prior to recruitment or selection of the study population? Were the same underlying criteria used for all of the subjects involved? This issue is related to the description of the study population, above, and you may find the information for both of these questions in the same section of the paper.



Most cohort studies begin with the selection of the cohort; participants in this cohort are then measured or evaluated to determine their exposure status. However, some cohort studies may recruit or select exposed participants in a different time or place than unexposed participants, especially retrospective cohort studies–which is when data are obtained from the past (retrospectively), but the analysis examines exposures prior to outcomes. For example, one research question could be whether diabetic men with clinical depression are at higher risk for cardiovascular disease than those without clinical depression. So, diabetic men with depression might be selected from a mental health clinic, while diabetic men without depression might be selected from an internal medicine or endocrinology clinic. This study recruits groups from different clinic populations, so this example would get a "no."

However, the women nurses described in the question above were selected based on the same inclusion/exclusion criteria, so that example would get a "yes."

Question 5. Sample size justification

Did the authors present their reasons for selecting or recruiting the number of people included or analyzed? Do they note or discuss the statistical power of the study? This question is about whether or not the study had enough participants to detect an association if one truly existed.

A paragraph in the methods section of the article may explain the sample size needed to detect a hypothesized difference in outcomes. You may also find a discussion of power in the discussion section (such as the study had 85 percent power to detect a 20 percent increase in the rate of an outcome of interest, with a 2-sided alpha of 0.05). Sometimes estimates of variance and/or estimates of effect size are given, instead of sample size calculations. In any of these cases, the answer would be "yes."

However, observational cohort studies often do not report anything about power or sample sizes because the analyses are exploratory in nature. In this case, the answer would be "no." This is not a "fatal flaw." It just may indicate that attention was not paid to whether the study was sufficiently sized to answer a prespecified question–i.e., it may have been an exploratory, hypothesis-generating study.

Question 6. Exposure assessed prior to outcome measurement

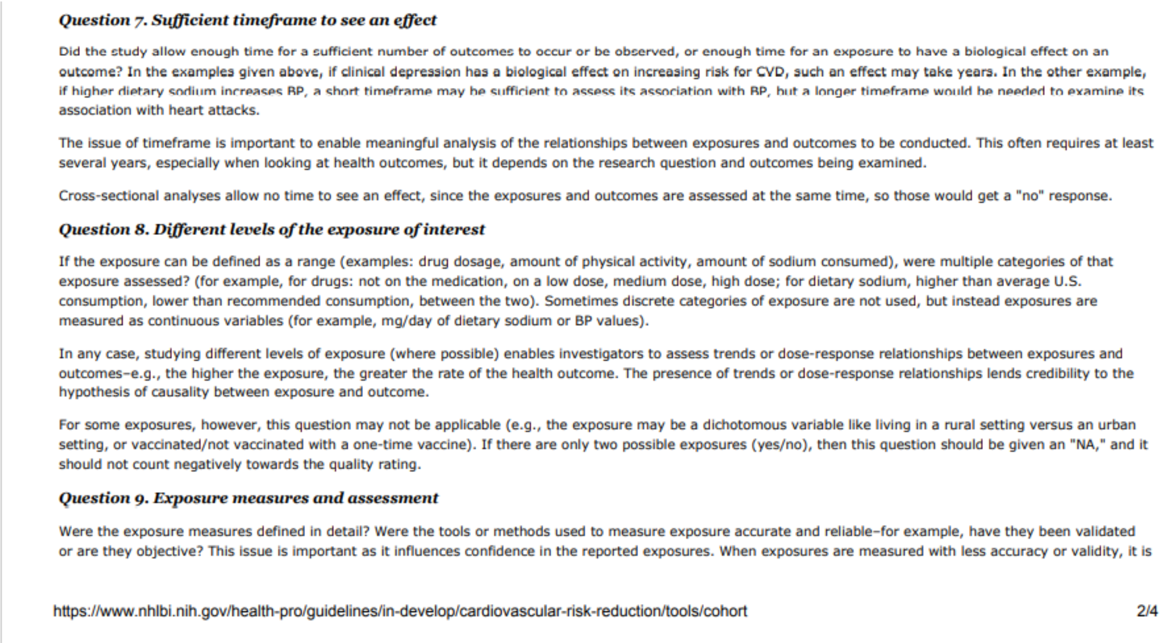
This question is important because, in order to determine whether an exposure causes an outcome, the exposure must come before the outcome.

For some prospective cohort studies, the investigator enrolls the cohort and then determines the exposure status of various members of the cohort (large epidemiological studies like Framingham used this approach). However, for other cohort studies, the cohort is selected based on its exposure status, as in the example above of depressed diabetic men (the exposure being depression). Other examples include a cohort identified by its exposure to fluoridated drinking water and then compared to a cohort living in an area without fluoridated water, or a cohort of military personnel exposed to combat in the Gulf War compared to a cohort of military personnel not deployed in a combat zone.

With either of these types of cohort studies, the cohort is followed forward in time (i.e., prospectively) to assess the outcomes that occurred in the exposed members compared to nonexposed members of the cohort. Therefore, you begin the study in the present by looking at groups that were exposed (or not) to some biological or behavioral factor, intervention, etc., and then you follow them forward in time to examine outcomes. If a cohort study is conducted properly, the answer to this question should be "yes," since the exposure status of members of the cohort was determined at the beginning of the study before the outcomes occurred.

For retrospective cohort studies, the same principal applies. The difference is that, rather than identifying a cohort in the present and following them forward in time, the investigators go back in time (i.e., retrospectively) and select a cohort based on their exposure status in the past and then follow them forward to assess the outcomes that occurred in the exposed and nonexposed cohort members. Because in retrospective cohort studies the exposure and outcomes may have already occurred (it depends on how long they follow the cohort), it is important to make sure that the exposure preceded the outcome.

Sometimes cross-sectional studies are conducted (or cross-sectional analyses of cohort-study data), where the exposures and outcomes are measured during the same timeframe. As a result, cross-sectional analyses provide weaker evidence than regular cohort studies regarding a potential causal relationship between exposures and outcomes. For cross-sectional analyses, the answer to Question 6 should be "no."



Question 7. Sufficient timeframe to see an effect

Did the study allow enough time for a sufficient number of outcomes to occur or be observed, or enough time for an exposure to have a biological effect on an outcome? In the examples given above, if clinical depression has a biological effect on increasing risk for CVD, such an effect may take years. In the other example, if higher dietary sodium increases BP, a short timeframe may be sufficient to assess its association with BP, but a longer timeframe would be needed to examine its association with heart attacks.

The issue of timeframe is important to enable meaningful analysis of the relationships between exposures and outcomes to be conducted. This often requires at least several years, especially when looking at health outcomes, but it depends on the research question and outcomes being examined.

Cross-sectional analyses allow no time to see an effect, since the exposures and outcomes are assessed at the same time, so those would get a "no" response.

Question 8. Different levels of the exposure of interest

If the exposure can be defined as a range (examples: drug dosage, amount of physical activity, amount of sodium consumed), were multiple categories of that exposure assessed? (for example, for drugs: not on the medication, on a low dose, medium dose, high dose; for dietary sodium, higher than average U.S. consumption, lower than recommended consumption, between the two). Sometimes discrete categories of exposure are not used, but instead exposures are measured as continuous variables (for example, mg/day of dietary sodium or BP values).

In any case, studying different levels of exposure (where possible) enables investigators to assess trends or dose-response relationships between exposures and outcomes–e.g., the higher the exposure, the greater the rate of the health outcome. The presence of trends or dose-response relationships lends credibility to the hypothesis of causality between exposure and outcome.

For some exposures, however, this question may not be applicable (e.g., the exposure may be a dichotomous variable like living in a rural setting versus an urban setting, or vaccinated/not vaccinated with a one-time vaccine). If there are only two possible exposures (yes/no), then this question should be given an "NA," and it should not count negatively towards the quality rating.

Question 9. Exposure measures and assessment

Were the exposure measures defined in detail? Were the tools or methods used to measure exposure accurate and reliable–for example, have they been validated or are they objective? This issue is important as it influences confidence in the reported exposures. When exposures are measured with less accuracy or validity, it is

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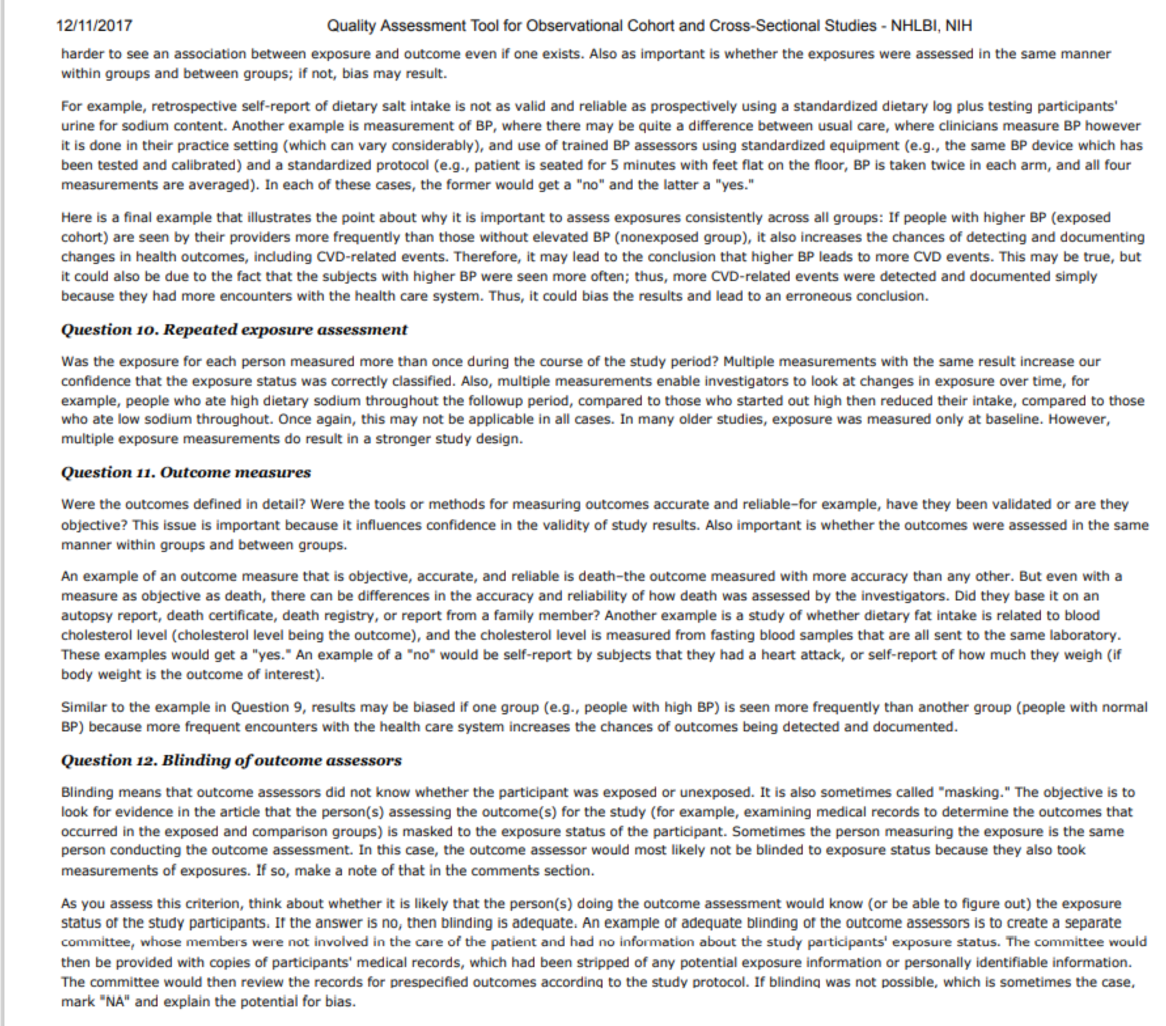


12/11/2017 Quality Assessment Tool for Observational Cohort and Cross-Sectional Studies - NHLBI, NIH

harder to see an association between exposure and outcome even if one exists. Also as important is whether the exposures were assessed in the same manner within groups and between groups; if not, bias may result.

For example, retrospective self-report of dietary salt intake is not as valid and reliable as prospectively using a standardized dietary log plus testing participants' urine for sodium content. Another example is measurement of BP, where there may be quite a difference between usual care, where clinicians measure BP however it is done in their practice setting (which can vary considerably), and use of trained BP assessors using standardized equipment (e.g., the same BP device which has been tested and calibrated) and a standardized protocol (e.g., patient is seated for 5 minutes with feet flat on the floor, BP is taken twice in each arm, and all four measurements are averaged). In each of these cases, the former would get a "no" and the latter a "yes."

Here is a final example that illustrates the point about why it is important to assess exposures consistently across all groups: If people with higher BP (exposed cohort) are seen by their providers more frequently than those without elevated BP (nonexposed group), it also increases the chances of detecting and documenting changes in health outcomes, including CVD-related events. Therefore, it may lead to the conclusion that higher BP leads to more CVD events. This may be true, but it could also be due to the fact that the subjects with higher BP were seen more often; thus, more CVD-related events were detected and documented simply because they had more encounters with the health care system. Thus, it could bias the results and lead to an erroneous conclusion.

Question 10. Repeated exposure assessment

Was the exposure for each person measured more than once during the course of the study period? Multiple measurements with the same result increase our confidence that the exposure status was correctly classified. Also, multiple measurements enable investigators to look at changes in exposure over time, for example, people who ate high dietary sodium throughout the followup period, compared to those who started out high then reduced their intake, compared to those who ate low sodium throughout. Once again, this may not be applicable in all cases. In many older studies, exposure was measured only at baseline. However, multiple exposure measurements do result in a stronger study design.

Question 11. Outcome measures

Were the outcomes defined in detail? Were the tools or methods for measuring outcomes accurate and reliable–for example, have they been validated or are they objective? This issue is important because it influences confidence in the validity of study results. Also important is whether the outcomes were assessed in the same manner within groups and between groups.

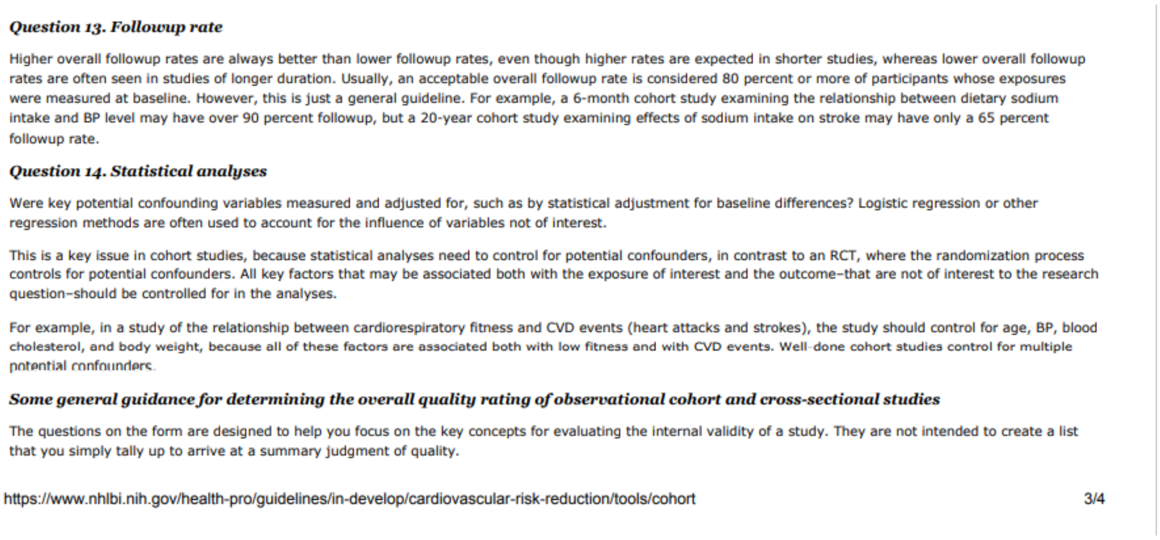
An example of an outcome measure that is objective, accurate, and reliable is death–the outcome measured with more accuracy than any other. But even with a measure as objective as death, there can be differences in the accuracy and reliability of how death was assessed by the investigators. Did they base it on an autopsy report, death certificate, death registry, or report from a family member? Another example is a study of whether dietary fat intake is related to blood cholesterol level (cholesterol level being the outcome), and the cholesterol level is measured from fasting blood samples that are all sent to the same laboratory. These examples would get a "yes." An example of a "no" would be self-report by subjects that they had a heart attack, or self-report of how much they weigh (if body weight is the outcome of interest).

Similar to the example in Question 9, results may be biased if one group (e.g., people with high BP) is seen more frequently than another group (people with normal BP) because more frequent encounters with the health care system increases the chances of outcomes being detected and documented.

Question 12. Blinding of outcome assessors

Blinding means that outcome assessors did not know whether the participant was exposed or unexposed. It is also sometimes called "masking." The objective is to look for evidence in the article that the person(s) assessing the outcome(s) for the study (for example, examining medical records to determine the outcomes that occurred in the exposed and comparison groups) is masked to the exposure status of the participant. Sometimes the person measuring the exposure is the same person conducting the outcome assessment. In this case, the outcome assessor would most likely not be blinded to exposure status because they also took measurements of exposures. If so, make a note of that in the comments section.

As you assess this criterion, think about whether it is likely that the person(s) doing the outcome assessment would know (or be able to figure out) the exposure status of the study participants. If the answer is no, then blinding is adequate. An example of adequate blinding of the outcome assessors is to create a separate committee, whose members were not involved in the care of the patient and had no information about the study participants' exposure status. The committee would then be provided with copies of participants' medical records, which had been stripped of any potential exposure information or personally identifiable information. The committee would then review the records for prespecified outcomes according to the study protocol. If blinding was not possible, which is sometimes the case, mark "NA" and explain the potential for bias.



Question 13. Followup rate

Higher overall followup rates are always better than lower followup rates, even though higher rates are expected in shorter studies, whereas lower overall followup rates are often seen in studies of longer duration. Usually, an acceptable overall followup rate is considered 80 percent or more of participants whose exposures were measured at baseline. However, this is just a general guideline. For example, a 6-month cohort study examining the relationship between dietary sodium intake and BP level may have over 90 percent followup, but a 20-year cohort study examining effects of sodium intake on stroke may have only a 65 percent followup rate.

Question 14. Statistical analyses

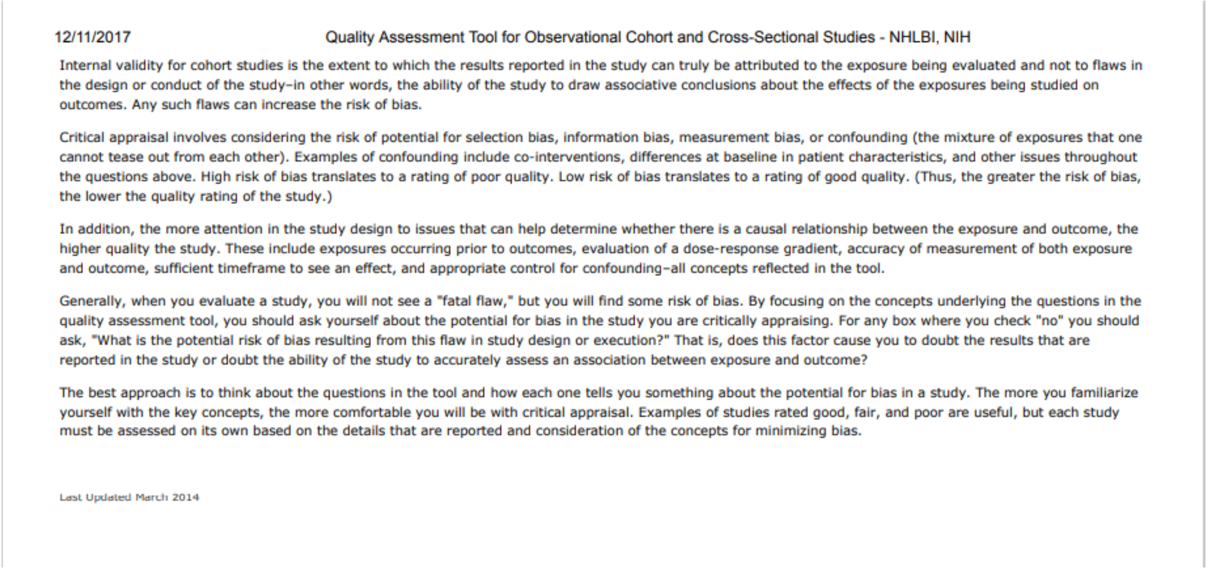
Were key potential confounding variables measured and adjusted for, such as by statistical adjustment for baseline differences? Logistic regression or other regression methods are often used to account for the influence of variables not of interest.

This is a key issue in cohort studies, because statistical analyses need to control for potential confounders, in contrast to an RCT, where the randomization process controls for potential confounders. All key factors that may be associated both with the exposure of interest and the outcome–that are not of interest to the research question–should be controlled for in the analyses.

For example, in a study of the relationship between cardiorespiratory fitness and CVD events (heart attacks and strokes), the study should control for age, BP, blood cholesterol, and body weight, because all of these factors are associated both with low fitness and with CVD events. Well-done cohort studies control for multiple potential confounders.

Some general guidance for determining the overall quality rating of observational cohort and cross-sectional studies

The questions on the form are designed to help you focus on the key concepts for evaluating the internal validity of a study. They are not intended to create a list that you simply tally up to arrive at a summary judgment of quality.



Internal validity for cohort studies is the extent to which the results reported in the study can truly be attributed to the exposure being evaluated and not to flaws in the design or conduct of the study–in other words, the ability of the study to draw associative conclusions about the effects of the exposures being studied on outcomes. Any such flaws can increase the risk of bias.

Critical appraisal involves considering the risk of potential for selection bias, information bias, measurement bias, or confounding (the mixture of exposures that one cannot tease out from each other). Examples of confounding include co-interventions, differences at baseline in patient characteristics, and other issues throughout the questions above. High risk of bias translates to a rating of poor quality. Low risk of bias translates to a rating of good quality. (Thus, the greater the risk of bias, the lower the quality rating of the study.)

In addition, the more attention in the study design to issues that can help determine whether there is a causal relationship between the exposure and outcome, the higher quality the study. These include exposures occurring prior to outcomes, evaluation of a dose-response gradient, accuracy of measurement of both exposure and outcome, sufficient timeframe to see an effect, and appropriate control for confounding–all concepts reflected in the tool.

Generally, when you evaluate a study, you will not see a "fatal flaw," but you will find some risk of bias. By focusing on the concepts underlying the questions in the quality assessment tool, you should ask yourself about the potential for bias in the study you are critically appraising. For any box where you check "no" you should ask, "What is the potential risk of bias resulting from this flaw in study design or execution?" That is, does this factor cause you to doubt the results that are reported in the study or doubt the ability of the study to accurately assess an association between exposure and outcome?

The best approach is to think about the questions in the tool and how each one tells you something about the potential for bias in a study. The more you familiarize yourself with the key concepts, the more comfortable you will be with critical appraisal. Examples of studies rated good, fair, and poor are useful, but each study must be assessed on its own based on the details that are reported and consideration of the concepts for minimizing bias.

Last Updated March 2014

EMPIRICAL RESEARCH PROJECT

The use of computer-assisted therapy (AVATAR therapy) to reduce the power of the eating disorder voice in patients with Anorexia Nervosa:

A qualitative exploration of the therapy experience

Supervised by Dr Thomas Ward & Dr Valentina Cardi

Abstract

Aims: Individuals with Anorexia Nervosa (AN) often report the experience of an eating disorder voice, which plays a crucial role in the maintenance of the disorder. In a novel clinical innovation, AVATAR therapy has been adapted from psychosis to be applied to eating disorders. The current study aimed to carry out a qualitative exploration of participants' experiences of taking part in the therapy and explore potential impacts of the approach and core aspects of treatment.

Method: The study employed a qualitative design and recruited 9 individuals with AN who had completed the intervention. Participants took part in semi-structured interviews and the data were analysed using thematic analysis.

Results: Four main themes emerged from the data. Participants reported that AVATAR therapy improved their ability to assert themselves over the voice, increased their motivation to recover and promoted improvements in self-compassion and behavioural changes in relation to eating. Externalisation of the disorder and differentiating between personal values and those of the eating disorder were identified as core treatment components. Participants provided feedback and reflections on several aspects of the therapy delivery, such as remote delivery, number of sessions, and optimal timing of the intervention. Directions for future developments emerged from the data such as involving significant others and increasing the number of sessions.

Conclusion: AVATAR therapy was generally perceived as relevant, acceptable and helpful to participants. Key drivers of recovery and maintenance factors of AN were targeted in AVATAR therapy, suggesting promising impacts and applications of this approach. Given the novel nature of this approach, more research is needed to better understand optimal therapy delivery and target groups.

Statement of Collaboration and Unique Contribution

Feasibility and acceptability of AVATAR therapy for Anorexia nervosa (AN) trial IRAS ID:292346, REC:21/LO/0384; Chief Investigators: Dr Valentina Cardi; AVATAR therapy lead: Dr Thomas Ward; Quantitative lead: Alistair Thompson (Author); Qualitative lead: Chiara Calissano; Co-investigator: Dr Janet Treasure; Trial therapists: Dr Alice Montague & Dr Hannah Ball.

This feasibility and acceptability trial included a qualitative and quantitative analysis. CC led the qualitative analysis which involved selecting the study design and developing the interview schedule used in the study described below. CC also contributed to delivering the AVATAR therapy sessions to three participants taking part in the trial as well as conducting the qualitative interviews with two participants. AT led on the quantitative analysis, which is subject to a separate Doctorate in Clinical Psychology submission. VC and TW adapted the therapy protocol from the brief AVATAR for psychosis protocol in consultation with patient and public involvement (PPI). CC contributed to the facilitation of one of the PPI sessions for individuals who currently had or had previously received a diagnosis of AN.

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1. Introduction

1.1 Anorexia Nervosa

Anorexia nervosa (AN) is an eating disorder characterised by extremely low body weight, associated with an intense fear of gaining weight and distorted cognitions regarding weight and shape, and a drive for thinness (American Psychiatric Association, 2013). AN onset is typically during mid-adolescence (Schmidt et al., 2016), a period of rapid brain development and profound psychological and social development (Foulkes & Blakemore, 2018). The aetiology of AN is complex and multifactorial, characterised by an interaction of factors including heritability and biological ones, and neuropsychological, socio-emotional, and socio-cultural ones (Treasure & Schmidt, 2013).

In the United Kingdom (UK), it is estimated that the lifetime prevalence of AN is 0.6%, with females being three times more likely to have the disorder (0.9%) than males (0.3%) (The National Institute of Mental Health, 2017). Anorexia Nervosa is one of the most challenging and resistant disorders to treat (Strober, 2010); the outcome of AN is variable and the prognosis is substantially improved with early intervention (Brown et al., 2018), with effective intervention within the first 3 years providing a critical window for recovery (Treasure & Russell, 2011). If the illness persists into adulthood, it becomes more difficult to treat, with 20% of affected individuals experiencing a chronic course of illness and 5% dying from the condition (Steinhausen, 2002; Steinhausen et al., 2009). Due to its severe and protracted course, it represents a high emotional and economic burden for sufferers, carers, health services and wider society in general (Birmingham and Treasure, 2010; Resmark et al., 2019). Anorexia Nervosa is characterised by the highest mortality rate of all psychiatric disorders and exceptionally high relapse rates (Arcelus et al., 2011). In the UK, AN has the highest proportion of hospital admissions and longest length of stay compared to other mental health disorders (Thompson et al., 2004).

The poor treatment outcome found in AN has been linked to the ego-syntonic attachment to maintaining low weight and the extreme ambivalence about wanting to change and recover from the disorder (Hay, Touyz & Sud, 2012). Research in this area and patients' reports have shown several factors that counter motivation to change despite recognition of the adverse effects of the illness on quality of life, physical health, social and emotional functioning (Hay, Touyz & Sud, 2012). For some, AN may offer a sense of identity, control and power, as well as a way of managing distressing feelings (Duncan, Sebar & Lee, 2015; Hay, Touyz & Sud, 2012). Having control over food and their body provides individuals with a sense of achievement and gratification which motivates them to maintain the restrictive behaviours; however, these positive feelings soon lead to a vicious cycle where individuals feel the need to lose ever more weight and employ stricter restraint to maintain a sense of achievement (Williams & Reid, 2010). People suffering from AN report experiencing a shift in their relationship with the disorder, which initially provides them with a sense of identity and control but over time starts to control them, their emotions and cognitions, and all aspects of their lives (Duncan, Sebar & Lee, 2015; Williams & Reid, 2010). As the disorder progresses, individuals report an internal battle with an aggressive adversary that they are unable to escape because it becomes an integral element of their being (Tierney & Fox, 2011). This domination of the self by the disorder includes the disorder taking its own "voice", which controls the individual, dictating their actions and expecting them to obey its commands (Higbed & Fox, 2010; Williams, King & Fox, 2016). This construct is usually referred to as "the eating disorder voice" or the "anorexic voice" (Aya et al., 2019; Higbed & Fox, 2010; Williams, King & Fox, 2016). This experience of hearing an inner voice is neither a real sensory experience nor an acoustic hallucination, but rather thoughts experienced as an actual voice (Firestone, 1986).

1.1.1 The eating disorder voice

In the clinical literature on anorexia nervosa, there are frequent references to the construct of the "eating disorder voice" (ED voice; Aya, Ulusoy & Cardi, 2019; Williams, King & Fox, 2016). As opposed to more typical self-critical thoughts, the ED voice is described as a second- or third-person commentary on actions and consequences relating to eating, weight, and shape (Pugh & Waller, 2017). Evidence suggests that the majority of individuals with EDs report the experience of the ED voice, with a study by Noordenbos and colleagues (2014) indicating a prevalence of 94.5% of patients, compared to 29.3% of healthy controls. The experience of an inner critical voice is not exclusive to individuals with EDs, but the frequency and content of it varies, with the ED population experiencing it more frequently and with an associated higher level of self-criticism and lower self-esteem than healthy controls (Noordenbos et al., 2014).

Different theoretical frameworks have been employed to understand the experience of the ED voice. For instance, Gilbert's (2001) evolutionary model of psychopathology states that evolved strategies for managing external relationships can be enacted on an internal level. The cognitive model of auditory hallucinations (Chadwick & Birchwood, 1994) suggests that distress arising from voice-hearing is linked not to their content or intensity, but how individuals appraise the voice. Dissociative models have also been used to understand the ED voice, suggesting that voice-hearing stems from dissociated cognitive content (often linked to early trauma) which intrudes upon conscious awareness (Longden, Madill, & Waterman, 2012; Pugh, 2016).

The ED voice is often described in relational terms, with individuals reporting positive or negative interactions with it (Noordenbos, Aliakbari & Campbell, 2014). In the early stages of the illness, the voice is often identified as positive, helpful, as a "friend" and a source of companionship; however, as the illness develops, the voice typically becomes more negative, critical and hostile, described as an "enemy" and may dominate the person's whole way of thinking (Noordenbos, Aliakbari & Campbell, 2014; Tierney & Fox, 2011). Individuals describe the voice as critical, particularly in relation to their weight and body appearance, and reinforcing messages about the importance of engaging in anorexic behaviours such as restriction and compensation, while avoiding external pressures to eat more healthily (Tierney & Fox, 2010; Williams & Reid, 2012). Individuals may realise the dysfunctional and destructive nature of the ED voice, but typically feel powerlessness and unable to escape it as it becomes an integral element of their identity (Tierney & Fox, 2011; Williams et al., 2016). The voice undermines their confidence with critical and abusive remarks, attacking their self-esteem (Tierney & Fox, 2011), which is in line with the literature suggesting reduced self-esteem and increased self-criticism in individuals with AN (Noordenbos, Aliakbari & Campbell, 2014; Noordenbos & Van Geest, 2017).

These aspects of the voice experience reported in eating disorders mirror the core aspects of the experience of auditory verbal hallucinations found in psychosis. In the context of voices in psychosis, research suggested that key features of the voice associated with distress include its level of "malevolence", "omnipotence" and "identity" (Chadwick & Birchwood, 1994). Similar characteristics of the voice have been reported by studies with EDs, with individuals with AN reporting higher scores in relation to the malevolence, omnipotence and identity of the ED voice compared to control groups (Aya, Ulusoy & Cardi, 2019; Noordenbos & Van Geest, 2017). Additionally, they experience the voice frequently and loudly, with associated high levels of distress (Aya, Ulusoy & Cardi, 2019; Noordenbos & Van Geest, 2017; Pugh & Waller, 2016). Studies have also demonstrated that the intensity and appraisal of the ED voice is associated with eating psychopathology, duration of illness, body mass index (BMI) and eating disorder cognitions (Hay, Touyz & Sud, 2012; Pugh & Waller, 2017). Pugh and Waller (2017) examined the clinical impact of the ED voice in the maintenance of AN in a sample of 40 women with a diagnosis of AN. Findings suggested that the nature of the voice explained variance in eating attitudes; for instance, voice benevolence was associated with more pathological eating attitudes, whereas perceiving the voice as omnipotent was related with longer duration of the disorder (Pugh & Waller, 2017). Noordenbos and Van Geest (2017) examined differences in the voice between patients with high-BMI and low-BMI, and found higher levels of frequency, degree of suffering and duration of the voice in the low-BMI group compared to the high-BMI group. The previously presented findings are in line with findings from the psychosis literature whereby voice-related appraisals and response style have been shown to interact with the severity of the pathology (Birchwood et al., 2000; Birchwood et al., 2004).

In summary, the ED voice has a key role in the development and maintenance of AN and its symptomology, and in explaining some of the challenges encountered with this clinical group, such as ambivalence to change, pro-illness beliefs, low self-esteem and high self-criticism (Pugh, 2016). Growing evidence suggests that targeting the ED voice may represent a critical step in the recovery process, with a meta-synthesis of qualitative studies exploring outcomes in AN highlighting the essential role of learning to defend against the ED voice (Duncan, Sebar, & Lee, 2015). Similarly, a study by Jenkins and Ogden (2012) suggested that learning to control the ED voice plays an important role in reducing disordered eating. They conducted a qualitative study with 15 women with a diagnosis of AN; participants reported that by gaining control over the voice, the voice started to lose its power and allowed them to reduce disordered eating (Jenkins & Ogden, 2012). A pilot study by Hormoz, Pugh and Waller (2019) examined the relationship between features of the ED voice and therapy outcomes. A sample of 14 participants engaged in a course of either Cognitive Behavioural Therapy (CBT) or Cognitive Analytic Therapy (CAT); neither treatment approach had the primary aim of targeting the eating disorder voice (Hormoz, Pugh & Waller, 2019), but findings suggested that the perceived power of the ED voice was reduced during therapy whereas its qualities (i.e. benevolence, omnipotence and malevolence) were unchanged.

Research suggests that other therapy approaches such as Compassion-Focused Therapy (CFT) and Emotion-Focused Therapy (EFT) might be effective (Mayhew & Gilbert, 2008; Dolhanty & Greenberg, 2007; Pugh, 2016), whereby people engage in a dialogue with the voice to explore the meaning and personal relationship with it as well as developing more assertive responses and control over it (Aya, Ulusoy & Cardi, 2019; Duncan, Sebar & Lee, 2015; Williams & Reid, 2012). Individuals can start to regain control over their lives and find new sources of self-worth, exploring other aspects of their identity that go beyond body image and appearance (Duncan, Sebar & Lee, 2015).

1.2 Avatar Therapy

AVATAR therapy (Audio Visual Assisted Therapy Aid for Refractory auditory hallucinations) is a recently developed relational approach where participants create a visual representation of the entity that they believe is talking to them (i.e. the avatar) using specially designed computer software (Leff et al., 2013). The participant is supported by the therapist to engage in a dialogue with the avatar, in order to gain power and control over it. The procedure is typically comprised of 6 to 8 45-minutes sessions. The system is set up with two linked computers in two rooms; participants sit in one room facing the monitor which displays the avatar. The therapist sits in a second room with a monitor which displays a video of the participant and a control panel that allows them to talk to the participant in their own voice or in the morphed avatar voice (Craig, Ward & Rus-Calafell, 2016; Ward et al., 2020). In an initial session, participants report verbatim statements from the voice, which are then used by the researcher/therapist when voicing the avatar (Craig, Ward & Rus-Calafell, 2016; Ward et al., 2021).

This approach was developed to reduce the power of persistent auditory hallucinations in psychosis (Craig et al., 2015). It is based on the rationale that the way individuals make sense of and respond to their voices can determine the impact, distress and impairment that they experience (Ward et al., 2021). The approach seeks to increase perceived power and control over the voice, supporting participants to build assertiveness in relation to the voice. It facilitates a dialogue to modify the type of relationship between the voice and the individual, exploring potential unresolved social and emotional issues that may be relevant to the person's experience of voice hearing (Ward et al., 2021). Another important aim of AVATAR therapy is to support reflection on personal values and identity alongside working on self-compassion to build strength and resources to challenge the voice (Ward et al., 2021).

This AVATAR therapy approach was tested in a single blinded randomised controlled trial assessing the effectiveness on the frequency and severity of auditory hallucinations (Craig et al., 2018). One hundred and fifty patients with psychosis were randomly allocated to the AVATAR therapy or control condition (supportive counselling); both therapies were delivered over 7 50-minutes sessions (Craig et al., 2018). Findings showed that this brief, targeted intervention was more effective after 12 weeks of treatment (primary outcome) than supportive counselling in reducing the frequency, omnipotence and power of persistent auditory verbal hallucinations, with a large effect size (Craig et al., 2018). At 24 weeks follow-up, the difference between the two groups was no longer statistically significant, but the therapy outcomes obtained with the AVATAR therapy were sustained (Craig et al., 2018). In a second randomised controlled trial, AVATAR2, the research team is applying two versions of AVATAR therapy, one brief (6 sessions) and an extended version (12 sessions) (Garety et al., 2021).

AVATAR therapy has never been applied to AN, but the commonalities between voices in psychosis and EDs suggest it has the potential to be a powerful approach in the treatment of AN (Aya, Ulusoy & Cardi, 2019; Pugh & Waller, 2017). AVATAR therapy might help patients with AN understand and resolve issues underlying their relationship with the voice and manage the negative emotions associated to it, thus gaining greater control and power over the voice (Aya, Ulusoy & Cardi, 2019). Differences between psychosis and AN had to be taken into account in the adaptation of the approach: individuals with psychosis experience the voice as an externally generated entity which is disconnected to the self, whereas individuals with ED describe the voice as internally generated, and experience it both as a separate entity and a part of their personal identity. In addition, AN is often associated with low motivation to change, which is not reported in psychosis. This low motivation and ambivalence towards change was accounted in the adaptation of AVATAR therapy for ED, whereby exploring the relationship between the self and the disorder and resolving the ambivalence towards the voice was a key aim of the therapy in ED. In fact, key treatment components of Motivational Interviewing (MI)

(Galler & Dunn, 2011; Golan, 2013), such as creating feelings of discrepancy by comparing participants' values and goals with those of the disorder, were integrated in the AVATAR therapy approach for ED. Situations involving food and eating were also employed to bring the voice to life during the dialogues, and food exposure was also used when possible.

Preliminary work on applying Avatar therapy to AN has been carried out by Cardi and colleagues, whereby they conducted a proof-of-concept study, recruiting a sample of patients with AN and inviting them to create an avatar representing their voice (N= 15). All participants reported that the voice of the avatar matched well with their ED voice. During exposure to the avatar, patients reported moderate to high level of distress, which indicates that the representations of the voice were effective in activating emotions mirroring those experienced with the ED voice. These preliminary data indicated that participants could relate to the experience of living with the ED voice and that the creation of a visual and auditory representation of the internal voice was both acceptable and relevant. All participants expressed willingness to be re-exposed to the avatar with the aim of targeting the ED voice in the context of formal therapy sessions. This presented a promising base for exploring the use of AVATAR Therapy in individuals with AN. A collaboration between experts in AVATAR therapy for psychosis (Dr Ward) and experts in eating disorders (Dr Cardi and Dr Treasure) was initiated to adapt the approach for EDs. Participant and patient involvement work (PPI) was conducted to adapt the AVATAR therapy manual (brief version -6 sessions): individuals with lived experience of AN or those caring for a loved one with AN were invited to take part in online focus groups where they shared their feedback on the experience of the ED voice and views on the potential application of AVATAR therapy. In line with the proof-of-concept study, the focus groups suggested that AVATAR therapy was seen as a potentially relevant and helpful approach to target the ED voice. The main challenge identified was related to whether participants recognised an ED voice as opposed to "just thoughts" as well as concerns that it may feel invalidating to offer this therapy to those who do not recognise an ED voice. This was address in the process of creating the avatar, whereby those who did not recognise a voice but just thoughts were supported to create an AVATAR which was "good enough" to be used in the sessions.

1.3 The current project

The current study included participants receiving therapy as part of a case series conducted by Thompson and colleagues. This project specifically focuses on carrying out a qualitative analysis of participants' experiences of taking part in AVATAR therapy and exploring potential impacts of the therapy on ED psychopathology and identifying core aspects of treatment. It is the first time the therapy has been adapted to the ED context. It is crucial to understand how participants experience the approach and explore their views on potential applications. A qualitative methodology is employed to gain an in-depth and rich understanding of participant's experiences. The collected data will inform the understanding of the application of AVATAR therapy in EDs and future research and developments of the therapy in this area.

1.3.1 Research Questions

The study addresses the following questions.

(1) How do participants experience the AVATAR therapy approach? Specifically exploring: (a) the overall quality of experience; (b) any suggested changes and improvements to the intervention; (c) targets for future implementation of the intervention.

(2) What are the core aspects of treatment identified by participants? Are there any changes reported by participants in (a) eating disorder symptoms; (b) relationship with the self (e.g. sense of self; self-compassion; self-criticism); (c) relationship with others?

2. Method

2.1 Study design

The study employed a qualitative design. Participants completed semi-structured interviews individually at the end of 6 sessions of AVATAR therapy (see section 2.3 for full procedure).

2.2 Participants

Twelve (N= 12) participants were recruited to the case series, of which 11 (N= 11) completed all the therapy sessions. Nine participants took part to the current study, completing the qualitative interview, and were included in the final sample for analysis (N= 9). Several attempts (e.g. email, phone contact, letter) were made to include a drop-out participant in the current sample. Sample demographics are reported in the result section below (see section 3.1).

2.2.1 Inclusion and exclusion criteria

Participants were eligible to take part in the larger feasibility and acceptability case series if they met the following criteria:

a) over 16 years old
b) diagnosis of anorexia nervosa (including weight-restored individuals)
c) availability of a laptop and internet connection for the assessments and sessions
d) Receiving treatment for eating disorders and/or physical health monitoring from a health professional

Participants were excluded from the study if they were:

a) not fluent in English

b) diagnosis of psychosis, alcohol use disorder, substance use disorder

2.2.2 Sample size

The current study aimed to recruit a sample of 8 to 10 participants as data saturation was expected to be achieved with this sample of participants, in line with other qualitative studies in this area (Holmes et al., 2017; Westwood et al., Williams, King & Fox, 2016).

2.3 Procedure

Participants taking part in the wider case series were recruited via the TRIANGLE trial, an online NIHR-funded multicentre randomised clinical trial involving patients recruited from inpatient or day care eating disorder services from all over the UK (IRAS: 197114, ISRCTN: 14644379; Cardi et al., 2017). The study was advertised in the regular newsletters sent around to all participants in the TRIANGLE study who had consented to be contacted about further research (see appendix A). Participants replied if they were interested in taking part, and those participants were referred to the study team. Participants were clearly informed that their decision to participate in the study was their choice and that they could withdraw from the study at any time without any explanation. Participants were assured by the researchers that their decision to participate or not would not influence the care that they received from their GP or other clinical teams that they were involved with. Consent was obtained via an electronic form on Qualtrics. The researchers sent the study information sheet by email (see appendix B) and assessed eligibility to take part via an online video call. Once eligibility was confirmed, participants received a link to the Qualtrics Survey platform (www.qualtrics.com) and signed an electronic consent form (see appendix C). Participants were asked to complete a battery of online questionnaires (i.e. Demographic questionnaire; Eating Disorder Examination Questionnaire; Depression Anxiety and Stress Scale; Beliefs about the Voice; and the Self-criticism and Self-compassion Scale) (see appendix D, E, F, G, H, I) via a Qualtrics link. After completion of the questionnaires, participants completed one 90-minute assessment session, followed by 6 AVATAR therapy sessions (approximately 50-60 min each) where they interacted with the computerised avatar. All the sessions were conducted online using a video calling platform (Zoom video calling).

The current qualitative study recruited participants taking part in the case series conducted by the wider research team (AT; TW; VC). Participants who had completed the avatar therapy sessions were invited to take part in a 30 to 45-minutes interview (remotely via Zoom video calling) (see appendix J). Participants were informed that they would receive a £10 Amazon voucher for completing the qualitative interview.

2.4 AVATAR Therapy

The intervention was delivered by one clinician via an online video call platform (Zoom video calling). The AVATAR therapy software uses computer technology developed by the Speech, Hearing & Phonetic Sciences Department at University College London. An agreement between King´s College London (KCL) and University College London (UCL) is in place to use this software for the present study and to receive technical support to use the AVATAR therapy system. In the first session (assessment), following a clinical assessment of the role and characteristics of the eating disorder voice, participants created a computerised 2D representation of the eating disorder voice (avatar) on a computer. They were able to manipulate the facial and voice characteristics of the avatar and were asked to provide examples of the critical comments most often spoken by the ED voice. In the following sessions (6 therapy sessions), participants interacted with the avatar displayed on the computer screen for 5-10 minutes. Each session included a pre-dialogue, an active dialogue and a post-dialogue section. In the pre-dialogue, participants had the opportunity to discuss and reflect on the previous session, any learning and achievements as well as prepare for the active dialogue (e.g. through role plays and discussion with the therapist). During the active dialogue, the therapist facilitated the dialogue by speaking the avatar's voice as well as their own (therapist) voice. The therapist had a webcam link to the participant and therefore was able to monitor the participants' responses to the avatar. The main goal during the interaction with the avatar was for participants to stand up to the critical comments made by the avatar and build a sense of power, control and self-awareness in the context of the ED voice. In the post-dialogue section, participants reflected on the experience of interacting with the avatar and how they practiced standing up to the voice. The assessment session lasted up to 90 minutes whereas the other sessions lasted approximately 50-60 minutes.

2.4.1 AVATAR therapy manual

The content of the sessions had been adapted from the manual, written by Dr Thomas Ward and colleagues used to deliver a 6-session version of AVATAR-therapy (AVATAR-therapy brief) in an ongoing multi-site randomised trial in psychosis (Garety et al., 2021). The manual has been adapted by Dr Thomas Ward, Dr Valentina Cardi and Dr Janet Treasure through consultation and feedback with patients and carers; adjustments for remote therapy delivery were also made. A brief description of each session content and aims is provided in the table 1 below.

Table 1. Description of each AVATAR therapy session’s aims and contents

SESSION	**AIM**	**CONTENT**
Session 0 (assessment)	Assessment of ED voice, including verbatim content, and avatar creation.	To develop an understanding of the experience of the ED voice, including characteristics of the voice, power, triggers, impact on functioning, emotional experience. To

		identify verbatim content most often spoken by the voice. To create the computerised avatar.
Session 1	To engage in active dialogue with the avatar practicing calm assertiveness. The dialogue is facilitated to end on a "win".	To explore and practice calm assertiveness in responding to the voice by supporting participant to identify an assertive role model and generate some assertive responses to the voice. The participant engages in first active dialogue with the avatar, ending the dialogue with a minor win.
Session 2	To build assertiveness (i.e. power and control) and drop avoidance and safety behaviour. Avatar pushes back before making a graded concession.	The participant builds assertiveness by reflecting on role of the voice in their life (e.g. a bully; critical). They work on assertiveness (e.g. tone of voice; eye-gaze; posture) and drop any safety behaviours. The avatar makes a concession by noticing a change in the participant's responding.
Session 3	To practice assertiveness from standing in a confident posture. Consolidating sense of power and control. Avatar voicing clear concession.	The participant builds on prior achievements and practices talking to the avatar by standing in a confident posture. The avatar voices a clear concession by noticing the change in the participant and how they are seeing them in a different light.
Session 4	To explore personal qualities and build a narrative around positive change. Full avatar concession.	The focus shifts towards improvements in self-concept, self-esteem and identity. This dialogue is identified as an opportunity for the participant to communicate who they really are as a person and how they plan to move forward. A rationale for the voices leaving the person alone (or having a diminishing role in their life) starts to emerge.
Session 5	To continue work around self-concept and self-esteem. Avatar exerting reduced control and power.	Emphasis is on building and consolidating positive changes in self-concept and self-esteem. The avatar acknowledges the participant's personal qualities and delivering a full concession (e.g. I have nothing left to say; if you continue to do X, my power is fading).
Session 6	To review and consolidate positive changes. To generalise learning to daily life.	The main themes which emerged and positive changes are reviewed and consolidated. The participant communicates a plan for moving forward and the avatar voices the fundamentally changed nature of the relationship and says goodbye.

2.4.2 Therapists

The AVATAR therapy sessions were delivered by a team of five clinical psychologists and trainees clinical psychologists. Dr TW is a research clinical psychologist working as therapy lead for the AVATAR Therapy trial for Psychosis who conducted sessions with 4 participants; Dr AM and Dr HB are research clinical psychologists working as therapy coordinators in the AVATAR Therapy Trail for psychosis; the conducted sessions with 1 and 2 participants respectively. Two trainees clinical psychologists (CC and AT) also delivered the sessions. AT conducted the sessions with 2 participants while CC conducted the sessions with 3 participants. They received weekly 1-h supervision from Dr VC. Dr VC is a clinical psychologist with an expertise in eating disorders, who had a supervisory role and conducted some of the qualitative interviews alongside CC.

2.5 Measures

Demographic measures alongside measures to assess characteristics of the voice, eating disorder symptoms, self-criticism and self-compassion and depression, anxiety and stress reactions and management were used in the current study to provides a summary of the demographic characteristics of the current sample of participants as well as descriptive statistics of key variables. These were completed by all participants taking part in the case series (Thompson and colleagues) before taking part in the avatar therapy sessions.

2.5.1 Demographic and clinical measures

A demographic questionnaire was used to assess different demographic variables and clinical features related to AN. The demographic section covered areas such as age, gender, educational level, marital status, children and employment status; the clinical section asked information regarding the participant's onset of AN, family history of AN, and current, lowest and highest weight, medication, and any other mental health diagnosis.

2.5.2 Psychotic Symptom Rating Scale

The Psychotic Symptom Rating Scale (PSYRATS; Haddock et al., 1999) is a self-report 11-item measure which assesses different aspects of the voice experience such as voice frequency, duration, loudness, distress, and amount of negative content of the voice. Participants rate their extent of agreement with each statement on a 5-point Likert scale, ranging from 0 to 6, with higher scores indicating greater endorsement of belief. Previous research from Drake and colleagues (2007) validated the reliability to the scale, indicating a Cronbach's Alpha of .76.

2.5.3 Beliefs about the Voices Questionnaire-Revised

The Beliefs about the Voices Questionnaire-Revised (BAVQ-R; Chadwick, Lees & Birchwood, 2000) is a 35-item self-report measure which assesses beliefs about voices and the emotional and behavioural reaction to them. Participants rate their degree of agreement or disagreement with each statement on a 4-point Likert scale, ranging from 1 (disagree) to 4 (strongly disagree), with higher scores indicating greater endorsement of belief. Psychometric properties of the scale have been demonstrated in previous studies within eating disorder samples (Hormoz, Pugh & Waller, 2019; Pugh & Waller, 2016). In line with previous studies, the term "voices" was replaced with the "eating disorder voice".

2.5.4 Eating Disorder Examination Questionnaire

The Eating Disorder Examination Questionnaire (EDE-Q; Fairburn & Cooper, 1993) is a 28-item self-report questionnaire which measures several features of eating disorder psychopathology. It measures eating behaviour and attitude over the previous 28 days. A Likert scale from 0 (= 0 days) to 6 (= 28 days) is employed in the measure, with higher scores indicating a greater severity of the ED. Psychometric properties of the measures have been validated by previous studies, with a reported Cronbach's Alpha of .96 (Luce & Crowther, 1999).

2.5.5 Self-Criticism and Self-Compassion Scale

The Self-Criticism and Self-Compassion scale (SCCS; Falconer, King & Brewin, 2015) is a 5-item scenario-based measure assessing self-criticism and self-compassion in response to imagined negative scenarios (e.g. you have just dropped and scratched your new Smartphone). Participants use a 7-point Likert scale ranging from 1 (not at all) to 7 (highly) to rate the extent to which they would react in a soothing, reassuring, compassionate, or harsh, contemptuous, critical way. The items are summed to obtain a measure of self-compassion and self-criticism, with higher scores indicating higher levels of both. Psychometric properties have been validated by previous studies, reporting a Cronbach's Alpha of 0.92 (Halamova, Kanovsky & Pacuchova, 2018).

2.5.6 Depression Anxiety Stress Scale

The depression anxiety stress scale (DASS-21; Henry & Crawford, 2005) is the short version of the 42-item (Lovibond & Lovibond, 1995) self-report measure which is used to measure distress along the 3 axes of depression, anxiety and stress reactions and management. Each question is rated from 0 (did not apply to me at all) to 4 (applied to me very much or most of the time). The psychometric properties have been investigated by other studies, suggesting a Cronbach's Alpha between 0.86 and 0.90 (Gloster et al., 2008).

2.6 Semi-structured interview

At the end of the intervention stage, once participants had completed the AVATAR therapy sessions, in-depth semi-structured interviews were conducted by VC and CC using an interview topic guide (see appendix J). The topic guide was designed following a review of the relevant literature and in-depth discussions with the supervisory team and a member of the research team (DCB) with lived experience. The series of open questions and follow-up questions were designed to explore participants' experience of therapy and potential impacts of the therapy on their understanding and relationship with the ED voice as well as on their ED. Participants were also asked about their views on the potential involvement of significant others, stages of application, comparison of AVATAR therapy with other treatments and potential changes to the approach. The interviews lasted approximately between 22 minutes (Min= 22:21) and 40 minutes (Max= 40:16), with an average duration of 33 minutes (M= 33:25). They were all electronically recorded and transcribed.

2.7 Analysis

The demographic data and the questionnaires data of the experience of the ED voice were described by using means and standard deviations, minimum and maximum values, and frequencies.

The interview transcripts were analysed using thematic analysis (Braun & Clarke, 2006), a method to identify, analyse patterns (i.e. themes) within data as well as to provide an insightful interpretation and a comprehensive overview of the subject matter. This method was selected as it allows to analyse a large amount of data in a flexible way, without any preconception or through any theoretical framework. The different phases and processes of thematic analysis were followed (Braun & Clarke, 2006; Nowell et al., 2017). These are summarised in the table below (see table 2). The analysis was conducted by two members of the research team (CC & DCB) with support and consultation with the other researchers (VC; TW; AT). Interview data were managed using the software NVivo (Release 1.0) for Windows. The qualitative analysis conducted in the current project is in line with the COREQ (COnsolidated criteria for REporting Qualitative research) Checklist (Tong, Sainsbury & Craig, 2007) (see appendix K).

This study used a primarily inductive approach, whereby data were open coded without a pre-existing coding frame. However, a degree of deductive analysis informed by existing theory and literature on AVATAR therapy and experiences of the eating disorder voice in AN was used to ensure that the coding produced themes that were meaningful to the research questions (Byrne, 2021). Deductive analysis was primarily used for naming and grouping themes and subthemes in a meaningful way to answer the research questions. As such, reflexive thematic analysis and an approach grounded in interpretivism that acknowledged the researcher's active role in knowledge production and interpretation of the data were used (Braun and Clarke 2019).

Following phases 1 and 2, themes were proactively generated by examining the relationship between different codes and actively construing patterns of codes from the data that represented both latent and semantic themes and subthemes that helped answer the research questions (Braun and Clarke 2019). Subthemes were defined as focusing on one specific element of the umbrella concept. During a process of review with the study team, the dataset was reviewed and refined until it was agreed that the thematic framework reflected the dataset and meaningfully engaged with the research questions.

Table 2. Description of the thematic analysis phases

Phase	**Description of the process**
Phase 1	Familiarisation with the data involved listening to the interview's recordings and checking the auto-generated transcripts for accuracy. Transcripts were re-read, noting down initial ideas.

Phase 2	CC and DCB started to independently code the data of 3 interviews, noting important features and generating initial codes. A consultation was held between the two researchers and any differences in coding and any ideas for further coding were discussed and resolved.
Phase 3	CC and DCB continued to develop the initial coding framework through analysis of further transcripts. As anticipated, after having coded 7 interviews, data saturation was reached. Through ongoing discussion with the rest of the study team, the coding framework was built and refined until consensus was reached.
Phase 4	The coding framework was then applied to all remaining transcripts and discussions were held around the list of codes and supporting quotations to ensure they were reflective of the data.
Phase 5	All the codes were collated into potential themes, gathering all data relevant to each potential theme. Clear definitions and names for each theme were generated.

2.7.1 Reflexivity

Data analysis was carried out by CC, with support of DBC. CC is a white female researcher of Italian origin in her late twenties, who conducted the project as part of her Doctorate in Clinical Psychology. Her clinical experience included several years working with young people in a range of NHS CAMHS settings, including EDs, as well as a number of other NHS primary and secondary care mental health services as a trainee clinical psychologist. Her clinical and personal background had a potential impact on the way the data were analysed, leading to a potential bias in analysing the data to fit her experience of working with this clinical population, the theoretical basis of the study as well as cultural experience on views of appearance and eating habits. DCB is a clinical researcher with lived experience of EDs and extensive research experience in AN, who drew upon her lived knowledge and reflected on how this might influence her approach to the data. Seven interviews were conducted by another member of the research team (VC), a white female clinical psychologist of Italian origin, with extensive experience of working with EDs. VC had not been involved in the delivery of AVATAR therapy sessions but was involved in joint therapy supervision with TW. Two interviews were conducted by CC, who had delivered the intervention. To minimise potential biases, it was ensured that CC did not conduct any interviews to the participants with whom she delivered the therapy. Frequent and extensive discussion throughout all the stages of data analysis was conducted with the research team (VC; TW; AT; DCB) to reduce potential biases. However, the lack of diversity with respect to ethnicity and professional background within the research team is identified as a limitation of the study.

CC had regular supervision, where she was able to reflect on her own experiences throughout recruitment and delivery of the intervention, as well as how her own personal values, gender, age, culture and profession might have influenced the dynamics between herself and the participants, and the potential influences any differences may have had on the data collected. CC maintained an awareness of the sensitivity of the interview topic throughout the study and approached the data with a curious stance, keeping the participants as the experts.

2.8 Ethical and R&D Approval

NHS ethics approval was granted (REC Reference Number: 21/LO/0384) for this study (see appendix L for documentation).

3. Results

3.1 Sample characteristics

Table 3 provides a summary of the demographic characteristics of the current sample of participants as well as descriptive statistics data. Importantly, the demographic data show how the sample included participants of different ages, different stages of illness and severity of underweight, as represented by Body Mass Index (BMI). The baseline data include measure of eating disorder psychopathology (Eating Disorder Examination Questionnaire), general mental health (Depression Anxiety Stress Scale), self-criticism and self-compassion (Self-Criticism and Self-Compassion Scale) and voice characteristics (Beliefs About the Voice Questionnaire-Revised and Psychotic Symptom Rating Scale).

Table 3. Demographic and descriptive baseline data for the current sample

Variable		**Mean (SD)/ N**
Age (in years)	Range 18 - 44	26.55 (7.86)
Gender	Female	7
	Male	2
Ethnicity	White British	8
	Caucasian	1
Marital Status	Single	7
	Married	1
	Co-habiting	1
Education level (highest achieved)	A Level	5
	Undergraduate degree	3
	Postgraduate degree	1
Vocational Status	Full time employment	3

	Unemployed	2
	Student	1
	Sick leave	1
	Part time employment	1
	Other unspecified	1
Years with an ED	Range 1 – 3 years	1
	Over 4 years	8
Body Mass Index (kg/m^2)	Range 14.03 – 20.28	16.27 (2.11)
	BMI below 17.5	5
Comorbidity	None reported	4
	Depression	2
	OCD	2
	Depression & Anxiety	1
Medical condition	None reported	5
	At least one reported	4
Medication for psychiatric difficulty	None reported	1
	Antidepressant	6
	Antidepressant & Antipsychotic	2
EDE restraint*		M= 3.64 (SD =1.80) Max= 5.80 Min = 0.80
EDE eating concerns*		M= 2.73 (SD =1.21) Max= 4.80 Min = 1.40
EDE shape concern*		M= 4.24 (SD =1.46) Max= 6.00 Min = 2.00
EDE weight concern*		M= 3.58 (SD =1.55) Max= 6.00 Min = 1.80
EDE Total*		M= 3.55 (SD =1.37)

	Max= 5.60 Min = 1.73
DASS stress*	M= 19.33 (SD =8.60) Max= 34.00 Min = 8.00
DASS anxiety*	M= 10.00 (SD =6.56) Max= 18.00 Min = 2.00
DASS depression*	M= 20.44 (SD =15.64) Max= 42.00 Min = 4.00
SCSC**	M= 23.77 (SD =10.82) Max= 47.00 Min = 15.00
BAVQ-R malevolence*	M= 11.66 (SD =4.77) Max= 18.00 Min = 3.00
BAVQ-R benevolence*	M= 3.22 (SD =3.27) Max= 8.00 Min = 0.00
BAVQ-R omnipotence*	M= 12.00 (SD =3.87) Max= 18.00 Min = 7.00
BAVQ-R Resistance* (emotional)	M= 8.77 (SD =2.59) Max= 12.00 Min = 5.00
BAVQ-R Resistance* (behavioural)	M= 8.11 (SD =2.37) Max= 11.00 Min = 5.00
BAVQ-R Engagement*	M= 1.77 (SD =2.17) Max= 7.00 Min = 0.00

PSYRAT-auditory*	M= 22.78 (SD =6.22) Max= 35.00 Min = 16.00

Index of terminology: *EDE= Eating Disorder Examination; DASS = Depression Anxiety Stress Scale; SCSC= Self-Criticism Self-Compassion Scale; BAVQ-R = Beliefs about the Voice Questionnaire Revised; PSYRAT = Psychotic Symptom Rating Scale. * higher scores is negative – indicative of higher level of psychopathology; ** is both positive and negative (in terms of higher self-criticism and self-compassion)*

3.2 Results of qualitative analysis of interviews

The figure below provides a visual representation of the 4 main themes and respective subthemes which emerged from the data. These are covered in detail in the sections below.

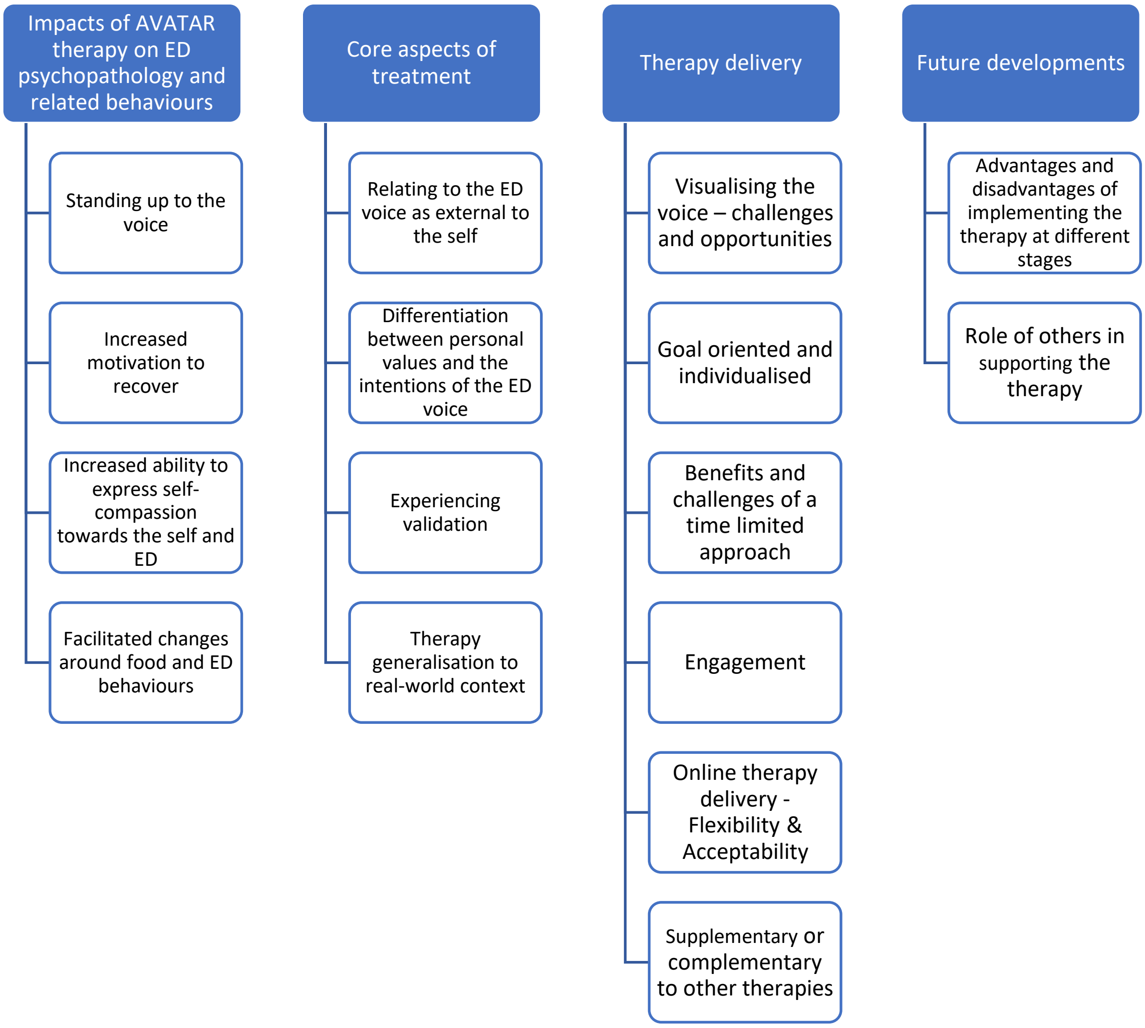

Figure 1. Visual representation of the main themes and subthemes

3.2.1 Theme 1 - Impacts of AVATAR therapy on ED psychopathology and related behaviours

One broad theme which emerged from the data related to the range of impacts of AVATAR therapy which participants commonly identified. By creating an auditory and visual representation of their ED voice and engaging in a dialogue with it, AVATAR therapy aimed to support participants to challenge the ED voice and practice standing up to the voice to gain more power and control over it. The data reflected these impacts: participants reported that AVATAR therapy enhanced their ability to stand up to the ED voice, increased their ability to express emotions towards the self and the ED, as well as enhanced their motivation to recover, and facilitated changes around food and other ED behaviours (e.g. exercise; decision-making around food; social life). These constituted four subthemes, which are described in detail below.

3.2.1.1 Standing up to the voice

All participants reported that AVATAR therapy improved their ability to stand up to the voice. The therapy supported them to appreciate that they had a choice in whether to engage with the voice or not and that they had the power to not listen to the voice and follow its commands, but to actually challenge it and do the opposite. Interestingly, most participants appreciated that to shut down the voice they did not have to engage in arguments and negotiations with it, but they could just (P1) "*turn around and say - no, that's not true or no - I'm not doing it*", and then shifting their attention to something else. The therapy supported participants to feel more empowered to (P7) "*be more dismissive [towards the voice]*" and made it (P7) "*a lot easier to just ignore it*". These quotes from participants exemplify this point:

> P6*: "[AVATAR therapy] has been so valuable in just learning that it is enough to just shut down the voice and do the opposite*"

> P6*: "Gaining an understanding that actually - I don't even need to listen to it. I don't need to understand it. I don't need to be compassionate towards it. I can just shut it down. I can be angry. I can just swear at it, I can shout at it. I don't have to be kind to it. That has really helped me move forward and just say "yes" to things and saying "no" to the eating disorder a lot more"*

AVATAR therapy also impacted on the ability to challenge the voice, providing the participants with tools to differentiate and set boundaries between their own personal intentions and the ED's intentions:

> P5: "*I feel more equipped to be able to say something back to the eating disorder and to stand up against the eating disorder"*

> P6: *"Being assertive in that way and physically standing up to it, just reminded me that I am the one in control and that I have the power to decide whether I listen to it or not"*

3.2.1.2 Increased motivation to recover

Another subtheme which consistently emerged from the data related to the impact of AVATAR therapy in increasing participants' motivation to recover. Individuals with ED are frequently ambivalent towards recovery, with their identity and self-worth closely linked with the ED. They are a clinical population which is frequently ambivalent and resistant towards treatment. The current data suggested that AVATAR therapy provided participants with more power and control over the voice, and also allowed them to externalise the ED and differentiate between their personal values and identity and the intentions of the ED voice – core aspects of treatment that will be discussed in the following sections. These factors provided opportunities for participants to reflect on their journeys towards recovery, highlighting how far they had gone as well as the steps that they still needed to make, emphasising that (P6) "*recovery is just a constant journey*" and that (P6) "*recovery is more than just restoring your physical health*". For instance, one participant reported:

P1: *"[the therapy] made me realize how far I've come and how much stronger I am now in being able to talk back to the voice"*

In addition, the therapy (P4) "*highlighted, the areas where I particularly struggle with the eating disorder*" and on which participants needed to focus to move forward in their recovery. For instance, one participant (P1) noticed the impact of their ED on their social life: "*I didn't realize how much of an impact it had on my social identity and the way that I interact with people and how I feel about myself in social situations".*

Importantly, most participants reflected on how the therapy boosted their motivation to recover and increased their confidence that their lives could be better. One participant (P2) reported: *"it gives you that kind of feeling that I can do something differently, that I have a chance to better than this"*; another one (P4) said: *"it has given me a little bit of a boost that I can do it, it showed me that I can be a lot stronger than I thought I was. Being able to challenge those thoughts in a different way, has kind of given me a little bit more confidence and a boost to challenge the thoughts and take some positive steps".*

3.2.1.3 Increased ability to express self-compassion towards the self and ED

Individuals with ED often struggle to express emotions and are very critical of themselves, with high standards of performance. AVATAR therapy sought to support participants to foster self-compassion, with participants reflecting on their personal qualities and values in life. The data reflected that this helped to increase their compassion towards themselves. This is illustrated in this participant's quote (P2): *"[the therapy] made me more compassionate to myself. Working on my values, what I value in my life. I'm grateful for just being humble for everyday things, whereas before all that kind of stuff was overlooked and I didn't really notice them too much because I was too busy listening to my eating disorder and all the negative stuff".*

Another participant (P6) reported that the therapy made them more compassionate and less self-critical: *"I shouldn't always beat myself up if I don't do well the first time, I can always come back to it again like the next day"*, whereas another one (P3) reflected *"that it was quite a relief to realize that it's not like I have a good and bad side of me, it's all good".*

Additionally, one participant (P7) reflected on how they found the self-compassion work helpful but difficult: *"I found that really helpful, but that was definitely the most difficult part. I think being kind - you do deserve food, or you shouldn't be beating yourself up for that".*

AVATAR therapy also provided an opportunity for participants to express emotions towards the ED, which for some participants (P6) was anger: *"I think something that I learned that was really helpful in AVATAR therapy is that it is OK to be angry at it and to not want to have compassion for it and to actually just ignore it and just shut it down and not pay it any attention"* or (P8) *"I can be angry, I can just I can swear it. I can shout at it. I don't have to be kind to it".*

3.2.1.4 Facilitated changes around eating and ED behaviours

Several participants described that AVATAR therapy supported them in making changes around food and other ED behaviours by learning to stand up against the voice and practicing it in situations related to eating and food choices. The data suggested that by being more able to shut down the voice, participants were more able to make different decisions around food and eating. For instance, two participants across the study chose to complete a behavioural experiment involving eating in front of the hostile avatar; one participant (P6) commented on it: *"I ate a gingerbread man while seeing and hearing the avatar and I was able to kind of shut it down and just eat it up".* Furthermore, one participant (P7) reported that the therapy was helpful in reducing *"the number of rituals which are associated with the condition",* such as exercise:

> P7: *"Exercise was a massive thing and the compulsions around it. Since doing the therapy, that's really not something that I'm thinking about so much. I was out with my dog the other day and there's a cut through a field so like diagonally across and in my eating disorder I would have had to walk the perimeter of the field as opposed to taking the shortcut"*

Several participants suggested that the therapy facilitated 'decision-making in the moment' where previously the ED would make an automatic choice. They now had 'enough' space to make an active choice:

> P3: *"it's just enough to make that choice and think that I'll deal with the ramifications later, I'm just going to do it now, in the moment, and then even if I feel awful about it later, at least I've done it, I've made the right choice"*

> P6: *"It's really helped with decision making on the spot, which means I can be more flexible and more spontaneous and just have more fun I suppose. I'm less in my head and more in the present"*

One participant (P5) described how they felt more prepared to decide on food, even in social situations, rather than having a long debate with their voice: *"my colleagues are kind of like: we're going to Starbucks. Do you want anything? In that moment I'm much more prepared to just say "yes" rather than have this 10-minute debate in my head".* Being able to switch off the voice and make a different decision seemed to also improve participants' ability to be more in the present: (P1) *"it made it easier for me to move on with my day and concentrate on actually being at university, doing my work and stuff"* or (P9)*"[I have been able to] engage and enjoy speaking my friends and also enjoy the food, which is something I never really thought would be possible again".*

3.2.2 Theme 2 – Core aspects of treatment

Another broad theme which consistently emerged from the data is related to the core aspects of treatment. As shown in the above section, AVATAR therapy had several reported positive impacts on different aspects of participants' relationship with the ED and their symptomatology. The following sections will discuss the aspects of treatment which supported and contributed to these changes. Participants' accounts led to the emergence of 4 main core components of treatment, namely: relating to the ED voice as external to the self (i.e. externalisation), experiencing validation, differentiation between personal values and the intentions of the ED voice, and therapy generalisation to real-world contexts. These constituted 4 main subthemes that are discussed in detail below.

3.2.2.1 Relating to the ED voice as external to the self

Broadly, participants found the process of "externalisation", that is separating the illness from the person by creating a visual representation of it, (P8) *"helpful, insightful and empowering"* and reported that it was something they struggled to do prior to engaging in the therapy. For instance, one participant (P5) reported: *"it helps to separate yourself from the condition, and because sometimes it's very hard to distinguish what is you and what is the eating disorder".* Externalising the ED seemed to be a validating experience for participants, as described in the below quote:

> P1: *"Sometimes I can fall into the trap of thinking that it is me and that it is my thoughts and that I want to have this eating disorder, so to externalize it and to have something else actually saying that to me and not hearing it in my own voice or in my own head or in my own thoughts, it's really helpful for me to be able to recognize that actually that's an eating disorder"*

Another benefit of relating to the ED as separate from the self was that it made it easier to challenge the ED and to perceive it as something which could be changed:

> P3: *"I think it makes it feel more fluid or more changeable, it feels more like something I can talk back to, that can change. It feels more like a relationship with a friend, like a separate entity to me. It doesn't feel so much like it's all in my head and like something that I can't escape from. I can give it a bit of distance; I'm going to take a step back. Before it felt completely inescapable like it was part of me, and however much I tried, it was never going to go anywhere."*

3.2.2.2 Differentiation between personal values and the intentions of the ED voice

An important part of AVATAR therapy work was to support individuals to reflect on their values, goals in life and identity and how their relationship with the ED voice fitted with them. Participants were encouraged to reflect on the nature and motives of the ED voice and were supported to gradually build more awareness of them. This was a theme which strongly emerged from the data, with most participants reporting that the therapy created an internal dissonance between what they identified as their values and what they came to understand as the true intentions of the ED voice. Participants reported a realisation of how the ED tried to get in the way of their values and goals, across different areas, from social to academic life. In the early stages of the illness, individuals with AN tend to perceive the voice as helpful and as a "friend", which is a maintaining factor of the disorder. The current data suggested that the therapy helped them to realise that (P2) *"my eating disorder isn't really my friend. It's something that's holding me back. It's something that's kind of dominating my life"*. Participants reported realising that (P3) *"it didn't really have my best interests at heart"* and *"how much it actually dominates parts of my day, parts of my life"* and how their ED is (P5) *"it's trying to ultimately kill you"*. This was an important realisation that was reported by many participants:

> P5: *"this experience has allowed me to appreciate the importance of the motivation of the eating disorder to try and drag you down by any means possible and that rather than sinking to its level and trying to come up with a counter argument after a counter argument, it's more effective just to say - I understand that you are trying to kill me or you're trying to make me very poorly and I'm going to choose not to listen to you rather than engaging in your specific argument"*

Some participants reflected on how their view of the ED has shifted over time, and even where they identified a function for them in the past, this function was no longer applicable:

> P3: *"I think what surprised me is that I viewed the disorder as something that was actually trying to help me, but I was getting it wrong, or maybe it's just outlived its use and maybe it used to be helpful when I was younger, and maybe I don't need it now. It was more about explaining that actually it's not helping and that was quite a relief to realize that"*

Additionally some participants reflected how the therapy helped them realise how the ED gets in the way of their goals and that (P1) *"if I listen to what it says and if I use university as an opportunity to not eat, I won't be able to stay at university. I won't be able to continue with my course and I'll just be throwing away all of the hard work that I've put in to get here".*

3.2.2.3 Experiencing validation

Another consistent subtheme which emerged from the data was how participants found AVATAR therapy validating of their experience and struggle with the ED. Participants described how the approach and the externalisation of the voice (P6) *"validated my experience and made me feel that what I'd been going through is real"*. Individuals with ED often struggle to separate the disorder from themselves, experiencing shame and feeling responsible for their own suffering. They also often find interactions with others invalidating, as other people commonly struggle to understand the complex and manipulative nature of their illness, as described in the below quote:

> P2: *"How much actually goes into the eating disorder and how is not all about the nutritional aspects. There's so much more behind it, like the critical thinking, how you feel about yourself".*

Externalising the disorder and engaging in a dialogue with the avatar was a powerful and validating process, which also opened up opportunities for validation in the broader social network (e.g. family, friends). In fact, some participants showed the recordings of the sessions to their friends and loved ones to allow them (P1) *"to gain a better insight into what we experience"*. This significantly increased their understanding of the participants' ED and the struggles that it brings to them and its pervasiveness across different areas, beyond food and eating. One quote exemplifies this point:

> P1: *"She's now more able to sort of understand why I find it so difficult to eat because it's not just you've got this thing in your head telling you don't eat. It's all the other things that come with it, and I don't think anyone without any disorder could understand it, but I don't think she understood the level to which it torments you, and the way it brings in everything about you into this one meal and telling you why you shouldn't eat"*

One participant (P2) noted that this process *"really built trust between me and my parents"* whereas another (P4) noted that it was helpful to show them that it was not their choice or fault: *"it gave them more of an insight of what goes on in my head, and that it's not me".*

3.2.2.4 Therapy generalisation to real-world context

The last subtheme which consistently emerged from the data and constituted another core treatment component is how the therapy was generalisable to the real-world. Participants reported that they found the therapy "*practical*" around making changes and focused on behavioural challenges around food and eating. One participant (P5) reported that the therapy was helpful *"to come up with some skills in terms of day-to-day management of the eating disorder"* whereas another one (P2) said: *"I really found myself going back to the recording just before mealtimes, just to look back and see how I challenged it".* It seemed that participants managed to apply the skills learnt in the sessions and stood up to the avatar in their real world:

> P3: *"I can really sort of visualize the screen and the avatar and I can actually take a moment to sort of run through a similar conversation and run through the part of the therapy session again in my head as I'm in my kitchen"*

Interestingly, participants reported that engaging in the sessions remotely from home in the same environment where they faced the challenges was helpful and made it easier to generalise the skills learnt:

> P9: *"I think it was really hard that you did all the [therapy] groups, but not in your home environment. Then you get used to follow the routine and doing what's expected when you're there [in the day care programme]. But then you come home, and you have the evening meal and snack to contend with on*

> *your own. It's like you're suddenly thrown into the deep end, so I think I've been able to talk back to it when I was out of the group situation, [the therapy] has given me that sort of support for the time that I wasn't there and for the rest of the days, because [the day care programme] was only Monday to Thursday."*

3.2.3 Theme 3 - Therapy Delivery

A major theme which also emerged from the data is related to participants' feedback on how the therapy was delivered. This included reflections on the process of the creating the avatar, feedback on timings of the therapy, and any benefits and challenges related to the approach. These are summarised in the 6 subthemes which are presented in detail below.

3.2.3.1 Visualising the voice – challenges and opportunities

A crucial part of AVATAR therapy is the creation of the avatar; the data collected reflected the challenges and opportunities that arose from this process. Some participants found the experience of creating the avatar (P3) *"easier and more helpful than expected"*, with a participant (P6) reporting: "*I'm a very creative person and a visual person and even just creating the avatar gave me a sense of achievement".* Another one (P3) explained that *"I thought it would be a lot harder to see the avatar visually and actually put a face to those thoughts. I thought that would be quite daunting and quite difficult, but actually it was easier than I thought it would be".*

In contrast, some participants found this process difficult, strange or odd, especially in the initial sessions, as they did not have an idea of (P1) *"what the avatar sounded like and kind of looked like".* For instance, they reported:

> P3: *"The first sessions were a bit strange, just the idea of having to talk to an avatar and trying to make the eating disorder a real thing was a bit of an odd concept. I did struggle with the first few sessions, like trying to actually imagine the avatar as the eating disorder because I don't experience it as a voice, I just experience it as thoughts; it was quite difficult for me to relate to the avatar itself, to the eating disorder"*

One participant reported that the visual aspect of the avatar creation was especially difficult:

> P1: *"For me it wasn't important to spend time trying to make the avatar feel real because no matter what I did, I just didn't like my eating disorder because my eating disorder definitely doesn't have a face. It may have been even better for me if there was no face and it was just a voice, because the face was a bit off putting to look at it, it wasn't strictly nice to sit and stare at something like that, it may have been easier for me to relate to it if it was just a voice"*

Participants also reflected on the specific visual characteristics of the avatar. For example, some participants reported: (P7) *"having the avatar be something that's not super detailed and having something that does look a bit unusual is really helpful. It makes it seem less scary";* similarly another one suggested that it would have been helpful to (P8) *"make the avatar less humanoid".* The option of selecting the gender of the avatar was really important for some participants: (P4) *"it was definitely important for me that it was a female voice, because obviously if anything, just to experience it as like* *my own voice"* or (P8) *"something that I found really interesting, that I've never really thought about before, and that I realized since creating that avatar, is that I definitely refer to my disorder as a male".*

3.2.3.2 Goal oriented and individualised

The data broadly reflected how participants found two core aspects of the therapy delivery helpful: being goal oriented and individualised. Participants appreciated how AVATAR therapy was targeted specifically on the ED voice:

> P4: *"I've never had a therapy that is just targeted towards my eating disorder. Any kind of therapy I've ever had was always broader, incorporating my eating disorder and everything within it. Whereas I found this helpful because it literally was just focusing on my eating disorder and the voice and everything about it: how it controls my actions, my life, my decisions, everything, and I thought that it was really helpful to just have that focus on that one aspect of it."*

Additionally, participants found helpful how the goals set for the sessions and the dialogues were very individualised to their specific experience. The avatar endorsed the characteristics of participants' ED voice and used verbatim statements that participants heard from the voice. At the beginning of each session, as part of the pre-dialogue, participants recalled a recent difficult experience where the voice was powerful and loud to bring the voice to life in the dialogue. These situations and the specific verbatim statements were used in the dialogue. For instance, participants reported:

> P2: *"The avatar was personalized to my experience; it was easier for me to relate that to the eating disorder, and it felt more realistic when I was talking back to it"*

3.2.3.3 Benefits and challenges of a time limited approach

Another subtheme which emerged from the data related to participants' reflections of engaging in a time-limited intervention. Participants were offered 1 assessment session and then 6 therapy sessions once a week. The data showed some of the benefits and some of the challenges of it. Some participants reported that 6 sessions were enough and that having a time limit-approach made them more motivated:

> P7: *"I think 6 is absolutely perfect"*

> P3: *"I was quite surprised at how positive it was in such a short time. I'd initially thought that six sessions didn't sound very much to make a change in terms of thinking, so I would say that surprised me"*

However, most participants reported that 6 sessions (P2) *"was far too short. I think there were a lot more things which could have been done"* and that (P1) *"it kind of ended just as I was getting the confidence to properly talk back to it".* Similarly another participant explained (P4) "*it can take you a good 2 maybe 3 sessions to get that confidence and get over that initial anxiety around it, especially with it being such a new form of therapy*". Some suggested that (P9) *"maybe like 12 sessions, 10 to 12 sessions for personally for me".*

3.2.3.4 Engagement

Another subtheme which emerged from the data related to engagement, that is what attracted and motivated participants to take part in the current study. The data suggested two main reasons related to engagement: (1) participants wanting to contribute to research and improve available treatments for ED and (2) participants wanting to engage in a novel approach, which was different from other therapies that they received in the past.

In relation to the first point, participants reported:

> P4: *"I wanted to take part because I thought, on one side, this is a chance for me to actually have some therapy and see what works for me, but also it's a chance for me to engage in something that could help other patients and could be a really good tool, and something that could be opened up to lots of other patients that are struggling and that need the help that they're not getting"*
>
> P6: *"I just wanted to help other people as much as I could and contributing with this feedback and helping you gain some data, if that helps to push it forward. Like if it was deemed really successful, this could be something that is accessible for a lot of people, and so I think that was my main motivation"*

Some participants also reflected on how (P1) *"I felt quite frustrated with like the therapies I have received over the years, and the lack of therapies especially, so just the idea of being able to contribute to potentially a new therapy that could help people. That was probably my main motivation"* or (P9) *"CAT didn't work, CBT didn't work, MANTRA did help, but I'm willing to give anything that will get this out of my life, and if I can help other people at the same time, then that's just a bonus".*

The second factor that attracted participant to engage in the therapy was the novelty of it: (P2) *"I have never really experienced something like it, it's kind of like a pioneering thing, that has never been done before"*. Participants were "curious" about trying a new approach and they (P4) *"liked a new idea in its early stages. And also, it's just something that you wouldn't necessarily think to do to treat AN".*

3.2.3.5 Online therapy delivery – flexibility & acceptability

AVATAR therapy makes uses of a computer software to facilitate a dialogue between the avatar and the participant. In the current study, due to COVID-19 restrictions and to increase accessibility to participants across England, the sessions were conducted remotely via a videocall platform. This is a variation from the original protocol which is delivered face to face but with the therapist and the participant engaging in the active dialogue using two adjacent rooms. Several participants described how they found participating in the therapy virtually highly acceptable, with some reflecting on how the COVID-19 pandemic made them used to online working and how (P3) *"I think I've become quite used to remote working in lots of different ways, so actually it didn't bother me at all. It felt quite normal".* The data suggested that since the pandemic, working virtually, including receiving therapy remotely, had become acceptable. This is exemplified in the below quotes: (P2) *"I think it actually worked well remotely. I know some people might prefer to be face-to-face, but I guess during the pandemic we've all gotten used to speaking online via zoom or something, so I didn't really mind"*. Interestingly, participants reflected on how AVATAR therapy was a computer-based therapy, which made it more acceptable to be conducted online: (P3) *"the fact that it was a sort of computer-based therapy in the sense that the avatar was on the screen, it didn't feel strange that the therapist was also on screen".*

Participants highlighted that one of the advantages of completing the sessions online was the flexibility, finding easier to schedule sessions in their working days and not having to commute to a clinical setting: (P4) *"to be able to schedule it in my working day was actually really easy and made it easier in terms of the flow of it and the frequency".* Additionally, one participant noted how having the sessions at home: (P5) *"it also gave me a bit more confidence because sometimes when you go into a clinical environment, it can be a bit daunting, and so having the comfort of being somewhere which is familiar was quite reassuring".* Completing the therapy online in the home environment also facilitated generalisation of skills, as discuss above in therapy generalisation subtheme. A few participants were positively surprised how there were no technological difficulties to accessing the therapy: (P4) "*it was quite smooth sailing and there weren't really any issues or any technical issues".*

The main issue with online therapy that was raised by some participants related to privacy:

> P6: *"I think one thing I would say about doing it online is that doing it in my bedroom, it feels less safe compared to if it was in a clinical space, because my family lived at home, they might overhear the things that I'm talking about with my therapist"*

An important note that was raised by one participant related to issues of safeguarding: (P6) *"I suppose it is kind of depending on what stage you're at, if the person who is receiving the therapy is quite poorly, like for safeguarding reasons, it would be better for them to see them face to face and notice if there's been any changes or any kind of self-harm or things like that".*

3.2.3.6 Supplementary or complementary to other therapies

The data also showed that participants reflected on how AVATAR therapy compared to other therapies they had received, and how they viewed it as a potential supplementary or complementary approach to go alongside other therapies or providing a missing element of other therapies. For instance, one participant highlighted the novelty factor of AVATAR therapy and how it could be helpful to supplement the several therapies in which they engaged:

P9: *"MANTRA[1] gave me something to fight for and CBT and CAT[2], the fact is I knew all of this already. I kind of, I know the logic behind it, I'd say I have a relatively good insight into it, but [AVATAR therapy] was something completely different and having something to fight against when you've just been battling with an unknown enemy was really helpful. And in combination with having something to fight for, it made it really useful because then you can bring stuff from MANTRA into the AVATAR therapy and the combination works really well"*

Another participant (P7) compared AVATAR therapy to MANTRA: *"the MANTRA therapy didn't really correlate with me too much, but I think with the Avatar as you can customize how your voice sounds and looks and what you see on the screen, it kind of relates more to what the person is actually feeling"*. In contrast, one participant (P6) suggested that *"[AVATAR therapy and MANTRA] - those two really go hand in hand".* A few participants also expressed views on whether AVATAR therapy should be conducted alongside other therapies or as a standalone treatment, and two participants expressed different views: (P5) *"In isolation, definitely on its own because I think if you've got too many things going on, then the impact is diluted. And if you can concentrate just on one form of treatment then I think that has more impact than getting confused with loads of different therapies"*. On the contrary, another participant said: (P8) *"I think for me actually it worked really well having it alongside the other treatment I was having".*

3.2.4 Theme 4 – Future developments

The last broad theme which emerged from the data was about the potential future developments of AVATAR therapy. Given the novel nature of the current study and being AVATAR therapy in its in infancy in the application to EDs, this constituted an important theme with implications for future research and developments. The data were clustered in two main subthemes which related to participants' feedback on the advantages and disadvantages of implementing the therapy at different stages of the illness and the potential role of others in supporting the therapy.

3.2.4.1 Advantages and disadvantages of implementing the therapy at different stages

Participants reflected on the timings for implementing the therapy, sharing their opinions on the potential advantages and disadvantages of applying the therapy at different stages according to their experience and recovery journey. A large proportion of participants suggested that the therapy could be applied in earlier stages of the illness: (P5) *"I think it's harder to do the longer that you've had an ED, and if [the therapy] could be done sooner I think it would be more effective because then you are challenging the negative pathways more quickly"* or (P2) *"if I had this therapy a few years ahead of*

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[1] MANTRA= Maudsley Anorexia Nervosa Treatment for Adults
[2] CAT = Cognitive Analytic Therapy

time, I would say it would have been more helpful to me". Other participants suggested that the therapy could be valuable at any stage:

> (P8): *"I think when someone is willing to engage with it at whatever stage that is because I think it can help at any stage. It can help if there's someone who perhaps isn't even ready to contemplate change, perhaps it could help them just raise that awareness and having that conversation with someone. And I think it could also benefit someone who's been in active recovery for a while, and they are doing really well but actually still have moments when they struggle"*

> (P6): *"I think because it's such like a practical skill and tool to learn, it could be so valuable at any stage. I think particularly when you first start to recognize that you might be struggling, and you need a bit of support. I think maybe even like as a prevention measure to prevent people becoming so unwell that they need to go to hospital. Just having the opportunity to explore what their voice, what the thoughts and what the eating disorder looks like, what it sounds like and kind of externalizing it and separating yourself from it"*

On the contrary, other participants reflected on the potential disadvantages of having the therapy earlier in their recovery journey and the potential difficulties that may arise from this. For instance, one participant suggested that (P2) *"it would have potentially made things worse for me as I experienced thoughts at the beginning, I probably wouldn't have understood that, and I may have potentially thought that there's something wrong with me because I don't experience it as a voice".* Similar concerns were reported by another one: (P1) *"if someone was telling me about the experience of an eating disorder voice and I didn't experience it in that way, that would have triggered something in me to say - you need to experience it in that way".* Further reflections were offered on whether the therapy could be applied to adolescents, with most participants raising concerns about it: (P1) *"I'm not sure how I would have received it when I was younger and I first got unwell, when I was about 13 or 14, I'm not sure it would have been appropriate for me to do that then. I think something that's tailored towards potentially older children or adults even just because I feel like it takes a certain degree of insight into it, and I don't know if I would have had that at that age"*.

A very important reflection that consistently emerged from the data related to the importance of motivation to change and engage in recovery. It was widely suggested that to successfully implement this therapy, individuals needed to be at a stage where they take responsibility for their recovery and (P8) *"they have to be willing to engage, if they're not going to engage with it, then there's no point*". Similarly, others reported: (P9) *"you need the motivation to try it and you want to get the benefits from it"* and (P4) *"I don't think it's for anybody that hasn't that motivation yet, because I think you really need some motivation and that strength to get your voice out and confront that voice that's in your head.* This highlighted the challenging nature of AVATAR therapy and that (P1) *"if you are not in that mindset, it's almost a bit pointless for you to try and argue back if you don't really want to argue back".*

3.2.4.2 Role of others in supporting the therapy

The last subtheme in relation to future developments of AVATAR therapy was about the potential role of others, such as loved ones, in supporting the therapy. Some participants made the choice of showing it to their loved ones, which was a strongly validating experience as discussed in the subtheme above. Others reflected in the interview about this idea. Some participants reflected that (P1) *"especially for younger people, I could see that would be quite beneficial to involve parents in the therapy".* One participant (P5) suggested that it could be helpful to have *"maybe four or five sessions with just yourself and the therapist and then having like a family session or a significant other session with the therapist, yourself and your caregiver or family member"*. This seemed to be potentially beneficial (P5) "*to make them aware of your goals and the bank of phrases that you have, so that they can maybe prompt you when they see that you're struggling*" and for (P6) "*the family to learn about how best to interact with the avatar and the voice and kind of learn the tools to shut it down or stand up to it*". Participants seemed to identify a role for loved ones to support them to apply and generalise the skills, especially (P8) "*if you're having a particularly difficult moment or at mealtimes*" and need some encouragement.

4. Discussion

This study aimed to qualitatively explore individuals' experience of taking part in AVATAR therapy to reduce the power of the eating disorder voice. This was part of a broader feasibility and acceptability case series which adapted and applied this novel intervention to a sample of participants with AN. This was a clinical innovation as it was the first time AVATAR therapy was adapted from psychosis to be applied to EDs and specifically anorexia nervosa. This study aimed to gather important qualitative information, crucial for the continued adaptation and development of this approach. Patient and participant involvement is key in developing and shaping new interventions and collecting participants' feedback on their experience of the approach was the main aim of the current study. Qualitative data from 9 interviews with participants who took part in the study were analysed thematically, to answer and explore: how did participants experience this approach and what did they identify as the core aspects of this treatment, and the impact of them? Four main themes emerged from the data which answered the above questions: impacts of AVATAR therapy; core aspects of treatment; therapy delivery and future developments.

4.1 Impacts of AVATAR therapy and core aspects of treatment

It was essential for this study to shed light on how AVATAR therapy worked in EDs, the potential impacts of the approach on ED psychopathology as well as what were the core aspects of the approach which were perceived as most helpful in targeting maintenance factors of the disorder.

The results suggest that the process of externalisation, that is to relate to the ED voice as external to the self, could be recognised as a core treatment component and key contributor of change. Externalisation is a therapeutic technique which originated in Family Therapy (White, 1984), which aims to separate the problem from the individual: “the person is not the problem; the problem is the problem”. Many psychological approaches for the treatment of EDs adopt this technique, such as Family-Based Therapy (Le Grange, Lock & Dymek, 2013; Lock & Le Grange, 2005), the Maudsley Family Therapy (Treasure et al., 2007), the Maudsley Model of Anorexia Nervosa Treatment for Adults (Schmidt et al., 2015), Narrative Therapy (White, 1998) and Schema Therapy (Pugh, 2019). These therapy approaches use different externalisation techniques such as writing letters to the ED, artwork to create a separate visual ED entity, or chair work to engage in a dialogue with the ED. There are limited quantitative findings in relation to the clinical benefits of externalisation, as it is often applied as part of a wider treatment approach. Generally, it has been suggested that externalisation can been beneficial in reducing blame and self-criticism, facilitating emotional expression, reconnecting with one’s own identity, and promoting change (Dimitropoulos et al., 2017; Nylund, 2002; Scott et al., 2013). However, as suggested by Vitousek (2005), there are also potential issues with the use of externalisation with EDs, especially with AN. AN is an ego-syntonic disorder, whereby individuals identify themselves with the disorder, seeing it as consistent with their sense of self and valuing their symptoms, such as maintaining low weight (Roncero et al., 2013). Therefore, externalising the ED could be perceived as an invalidating experience that goes against their sense of identity (Vitousek, 2005). In the current study, participants reported that externalising the illness from themselves was a process in which they struggled to engage in prior to taking part in the therapy, but which they recognised as having important implications and positive impacts on the self and their relationship with ED. As suggested by previous studies (Dimitropoulos et al., 2017; Nylund, 2002; Scott et al., 2013), externalisation seemed linked with an increased motivation to recover. Additionally, participants’ accounts suggest that this process was highly validating of their experience and suffering. In the current study, externalisation of the ED was combined with work around values and identity: in the sessions, reflection on personal identity, values, goals in life, and prior achievements was facilitated alongside discussion on the motives of the ED and detrimental impacts that it was having on their lives. This awareness raising of the true destructive aims of the ED seemed to create a sense of discrepancy between the self and the ED, and feelings of dissonance and inconsistency. Participants reported realising how the ED was not allowing them to live according to their values and how their whole identity and sense of self-worth had become entwined with the ED. This awareness raising and connection with personal identity as separate from the ED could be considered a core treatment component of AVATAR therapy and key driver of recovery, which also mitigated the risk of invalidation. Creating a sense of discrepancy between personal values and goals and those of the disorder is a key treatment component of Motivational Interviewing (MI) (Galler & Dunn, 2011; Golan, 2013), which was integrated in the AVATAR therapy approach to promote change. In fact, participants reported an increased motivation to change and recover as a result of the therapy. It could be suggested that externalising the illness made participants relate to their disorder as something which was separate from them and that they could challenge and change, whereas value and identity work increased their sense of self-empowerment that they had the ability to recover and build a life in line with their true values. Understanding key drivers of recovery is very important with this clinical group, given the high ambivalence about change and resistance to treatment which is often reported in the AN literature (Hay, Touyz & Sud, 2012). Studies about motivation to change in ED patients indicate that positive beliefs about ED decrease throughout the stages of change (Blake, Turnbull, Treasure, 1997; Rieger, Touyz, Beumont, 2002). The sample of participants of the current study included individuals at different stages of recovery and with varying illness duration. It is possible that AVATAR therapy promoted change through different mechanisms depending on the stage of recovery. For instance, it might have supported individuals who were early in their recovery journey to challenge positive beliefs about the ED and create a discrepancy between their personal values and the ED values, whereas it might have boosted self-empowerment in those individuals who were at a later stage of recovery.

Another important impact of AVATAR therapy which emerged from participants' accounts is that the therapy positively impacted on their ability to express emotions towards the self as well as the ED. In fact, externalising the illness, alongside value and identity work, resulted in an increase in self-compassion for most participants, while a minority reported an increase in anger towards the ED. Self-compassion is defined as the tendency to respond to personal distress and suffering with kindness and compassion rather than with judgment and criticism (Gilbert, 2005; Neff, 2003). Individuals with EDs, especially AN, are known to relate to themselves in a critical and judgmental way, often feeling disgust and shame towards their bodies and food intake (Goss & Allan, 2010; Kelly et al., 2021). They are also characterised by high levels of perfectionism and reduced emotional awareness and emotion regulation skills, with ED symptoms often used to suppress or regulate negative emotions (Harrison et al., 2010; Schmidt & Treasure, 2006). Higher levels of self-compassion are linked with reduced ED psychopathology; however, despite these benefits, individuals with EDs are often fearful of self-compassion, feeling undeserving of compassion and worrying about lowered personal standards (Gilbert et al., 2011; Kelly et al., 2021). In the current study, this fear of self-compassion is reflected in participants' accounts, reporting that for some it was the most challenging aspect of the intervention. Self-compassion work is an important component of many therapeutic approaches for EDs, such as Compassion-Focused Therapy (CFT; Gilbert, 2009; Mayhew & Gilbert, 2008) or Emotion-Focused Therapy (EFT; Greenberg, 2011). CFT aims to increase self-compassion through compassionate imagery, compassionate letter writing and guided practices in compassion attention, thinking and feeling; EFT uses chair work, a technique which facilitates a dialogue between the individual and either an internal (e.g. different part of the self) or external (e.g. significant others) entity (Dolhanty & Greenberg, 2007). AVATAR therapy mirrors some features of chair work. It aims to build compassion through externalisation of the illness and supporting individuals to deliver to the voice important messages about who they truly are, their personal qualities and values. The therapist supports this process by making the avatar voice a gradual concession, acknowledging this emerging narrative of positive change, where the participant is taking back control of their life (Craig et al., 2018). Participants' accounts seem to suggest that the therapy was successful at targeting self-compassion, with most participants reporting having more kindness for their suffering and an increased recognition that they deserve food and positive things in life. Recognising and connecting with emotions is a treatment component which has been suggested by previous studies as central in the recovery journey from AN (Duncan, Sebar & Lee, 2015; Jenkins & Odgen, 2012). An interesting factor which emerged from the data was that some participants reported an increased level of self-compassion to the ED voice. This is a clinical finding with important implications, which would require further exploration. It could be argued that self-compassion to the ED is part of the process of detaching from the illness and recovering from it, whereby individuals accept the impact that the ED had on their lives, by taking a compassionate stance towards it. Another potential explanation could be related to the ego-syntonic aspect of the ED, whereby increased compassion towards the self leads to a similar sense of compassion towards the ED. Furthermore, a couple of participants described that the therapy supported them expressing anger towards the ED and realising that they do not have to be "nice" all the time. This was an unexpected finding which emerged from some participants' accounts and that would also require further investigation in future research. In fact, there could be possible risks in eliciting or facilitating an angry response to the voice (as it is part of oneself and something that started as a coping mechanism), as opposed to a compassionate one. It would be important to understand the meaning behind this anger expression, and whether participants see it as an authorisation to shut down the voice and not listen to it or as anger directed to the disorder and themselves.

In addition to externalising the disorder, the second primary aim of AVATAR therapy is to support individuals standing up to the voice to increase their perceived power and control over it. The data suggested that this aim was successfully achieved and was regarded as a very helpful aspect of the therapy, with all participants reporting an improved ability to assert themselves over the ED voice. It is suggested in the literature that individuals with ED report low levels of assertiveness and high levels of submissive behaviour, experiencing social interactions as negative, and often perceiving others as more powerful (Cardi et al., 2014; Carter, Kelly & Norwood, 2012; De Paoli et al., 2017;

Hartmann, Zeeck & Barrett, 2010). Individuals who have experienced powerlessness and inferiority in social relationships have been found to be more likely to report similar experiences during the voice interaction (Birchwood et al. 2000). In fact, participants described experiencing the voice as a powerful, constant screaming, making comments about themselves and setting rules and requests that they need to follow. Individuals with EDs report experiencing very little power over the voice and feel unable to resist its commands, often despite the social pressure to challenge the ED cognitions (Tierney & Fox, 2010; Williams & Reid, 2012). This is especially found in individuals who have suffered from an ED for an extended period of time, where the ED starts to make automatic choices for them (Noordenbos et al., 2014; Tierney & Fox, 2011). In AVATAR therapy sessions, participants practiced standing up to the voice, using their assertiveness skills to shut down the voice or dismiss its commands. This process allowed them to appreciate that they had a choice in whether to engage with the voice or not and that they had the power not to listen to it but that they could actually challenge it and "act opposite". This is a very important finding suggesting that the therapy allowed them to have more mental space and energy to make an active choice instead of a passive one. "Opposite action" is a Dialectical Behavioural Therapy (DBT) skill that involves actively deciding to do the opposite of what the emotional experience or action urge dictates (Linehan, 2014). This is an effective strategy to alter the emotional experience or achieve a different outcome (Linehan, 2014). For instance, if the emotional experience is anxiety and the action urge would be to avoid, opposite action would involve approaching the feared object or situation. In the current study, participants reported being more able to make changes around food and to make decisions in the moment: by dismissing the voice, participants felt more able to make their own decisions, acting opposite to what the ED voice urged them to do, without thinking about the potential consequences or repercussions of it. Previous qualitative studies exploring drivers of recovery in AN suggested that gaining greater control over the voice and challenging the unhealthy thoughts it generates is essential (Duncan, Sebar & Lee, 2015; Jenkins & Odgen, 2012). In addition, individuals with AN often struggle to implement changes in relation to food and eating, thus the indication that AVATAR therapy has the potential to facilitate such changes represents an important finding.

4.2 Therapy delivery & future developments of the approach

AVATAR therapy applied to EDs is at an early stage of development and testing, with many questions related to its delivery, stages of application, potential target population and clinical setting to be addressed. In a first stage in the development of the approach, a proof-of-concept study and focus groups with patients and carers had been conducted by the current research team. This information was used to shape the therapy manual and therapy delivery as applied in the current study. The current project represented the crucial next step in the adaptation of the approach to the field of EDs by exploring in detail the experience of participants who had received the therapy. Many aspects of the therapy delivery had been adapted from the psychosis work to be applicable to a sample of participants with EDs. However, there are some differences between the clinical population of psychosis and that of AN which can impact on different aspects of the therapy. Therefore, the current study aimed to review these factors to make suggestions and adjustments for future developments.

In both conditions, the voice is associated with distress and often seen as a hostile, omnipotent, malevolent presence, which makes commands on individuals (Aya, Ulusoy & Cardi, 2019; Chadwick & Birchwood, 1994; Noordenbos & Van Geest, 2017). Both clinical groups struggle to be assertive in relation to the voice and experience little power and control over it. Therefore, building assertiveness skills represents a core treatment target key in both disorders. However, individuals with psychosis experience the voice as an externally generated entity which is disconnected to the self and associated with a range of distressing beliefs and experiences. On the contrary, individuals with ED describe the voice as internally generated, experiencing it as both a separate entity and a part of their personal identity. In addition, despite the voice is experienced as negative in both disorders, AN is often associated with low motivation to change, whereby individuals struggle to let go of the condition. This ambivalence to change is not reported in psychosis and needs to be accounted in the adaptation of AVATAR therapy for EDs. In fact, exploring the relationship between the self and the disorder and resolving the ambivalence towards the voice could be regarded as an important goal of AVATAR therapy in EDs, whereas the integration of the voice with the self could be more relevant to psychosis. In the context of ED and especially AN, integrating some Motivational Interviewing (MI) elements to any treatment approach can be important to address resistance to change (Galler & Dunn, 2011; Golan, 2013).

The creation of the avatar is a key part of AVATAR therapy and participants need to be able to relate to it to make the dialogue acceptable and meaningful. Interestingly, participants differed in their avatar creation, with some of them trying to make the avatar look like them whereas others having an image of it which differed from them, either in terms of age, gender or ethnicity, suggesting different phenomenology of the voice. In the context of AN, in contrast with psychosis, it was important to manage the perfectionistic expectations of participants and to support them to create an avatar which was "good enough" to work with. This was a key learning which emerged from the first participant who struggled to create an avatar and was applied to other participants. As the voice is not externally located as in psychosis, creating an avatar that matches their experience of the voice is slightly different and there could be more visual aspects of which participants are unsure compared to psychosis.

Two other important adaptations that were made from the psychosis trial related to the number of sessions and the online therapy delivery (Craig et al., 2018; Ward et al., 2021). The online therapy delivery was found acceptable by all participants and was also linked with an increased generalisation of the skills learnt in their everyday life and in their home environment. However, as raised by a few participants, there are some issues related to the privacy and safeguarding aspects of remote therapy. Individuals with AN frequently present high levels of self-neglect and are at high risk of physical health issues, which could be more difficult to assess and monitor when delivering the therapy remotely. Despite weight and physical health monitoring were not a target of the intervention, and participants remained under the care of their GP or local ED team, this is an issue to consider in future applications of the approach. Future developments could trial applying the therapy both virtually and face-to-face to assess the advantages and disadvantages of both approaches.

Additionally, it is important to consider the number of sessions (6 sessions), which was seen as too short by most participants. In AVATAR therapy, individuals are exposed to their ED voice and asked to challenge it, alongside working on their values and identity. This work could be considered challenging and anxiety provoking for participants; thus, as participants suggested, more sessions, such as 8 or 12, could be necessary to fully achieve these objectives. In the context of psychosis, two forms of AVATAR therapy are being currently trialled in the AVATAR2 randomised controlled trial: a brief version of the approach (6 sessions) or an extended version (12 sessions) (Garety et al., 2021). Future developments in the context of EDs could adopt a similar approach and trial both versions to better understand optimal therapy delivery. Integrating aspects of the extended AVATAR therapy which aims to understand the voice in the broader autobiographical context of the person's life and include broader treatment targets than assertiveness and self-esteem could be helpful in the context of AN (Ward et al., 2020). In addition, in the psychosis trial, participants engage in AVATAR therapy in addition to treatment as usual (TAU). The current study did not control for whether participants were engaging in other forms of therapy and thus there were differences within the sample. Participants expressed different perspectives on whether AVATAR therapy should be implemented as a stand-alone treatment or in conjunction with other therapies, with some suggesting that it can complement other therapies while others expressing concerns about the demands of engaging in two forms of treatment at the same time.

Participants also expressed different views on the stages of application of the therapy, with some suggesting that it should be applied in the early stages of the illness, and others suggesting that it could be helpful at any point. However, a consideration that was consistently reported and emphasised related to motivation to engage and recover. As reported above, individuals with AN are often ambivalent towards change and this represents a major obstacle to successfully engage with any treatment. Given the nature of the AVATAR therapy approach where participants are asked to actively stand up and challenge the ED voice, it was highlighted that those who take part should have at least some motivation to fight back the ED. Future applications of the approach could adapt the manual to meet the needs of people at different stages of recovery, for instance, with more integration of motivational interviewing informed avatar dialogues for earlier interventions.

Participants who took part in the current study differed in terms of age, BMI, and numbers of years they suffered with an ED. Future study should include more stratified samples of participants on the basis of age (i.e. 16-25 years old vs. older than 25), BMI (i.e. different samples for underweight vs. weight recovered) and numbers of years (i.e. below 3 years vs. above 3 years) to better understand how the approach applies across these variables.

Another important consideration which emerged from the data is related to the involvement of significant others in the therapy. Some participants shared clips from the session recordings with their loved ones and found this process validating and helpful. Involving others can potentially foster a positive therapeutic relationship between the patient and the carer, as well as a practical support for patients to implement the skills learnt at times of distress. Eating disorder symptoms are pervasive and intrusive into the family life, with interpersonal relationships becoming entangled with the disorder, and representing potential maintaining factors for EDs (Treasure & Nazar, 2016). Empowering parents and carers to provide support to individuals is a key part of some therapy approaches such as Family Therapy (Doyle et al., 2010; Treasure & Nazar, 2016). Based on this literature and participants' accounts, future applications of AVATAR therapy should consider formal involvement of family and carers into the therapy.

4.3 Limitations

The study has some limitations which are important to consider. Firstly, the interviews were conducted only with participants who had completed all the therapy sessions. Multiple attempts were made to complete the interview with one drop-out participant but were unsuccessful. The data collected could be partially skewed towards a more positive view of the approach as they are based on accounts of participants who successfully completed the therapy. Feedback from drop-out participants could have highlighted other aspects of it which may have not been picked up in the other interviews, such as what they struggled with the approach or what contributed to disengagement from the therapy.

Other limitations of the study are related to the analysis and interpretation of the data. It is important to acknowledge the limited diversity within the research team, which was all composed by trainee clinical psychologists or clinical psychologists of White background and with a similar professional background. This is a limitation as it might have biased the data based on cultural and professional background, such as more Eurocentric assumptions about body image and societal norms. It was hoped that having a researcher with lived experience of ED could have helped to keep participants' views at the centre and mitigate any potential bias. Additionally, there is suggestion from some qualitative studies that it is helpful to discuss the analysis and interpretation of the data with participants who have taken part in the interview. Even if not standard in thematic analysis, this would have been helpful to ensure that the data were not biased by the study aims and research questions as well as the personal and professional views of the researchers, but that they were representative of participants' views and feedback. Most participants reported an interest in being involved in any further participant and patient involvement initiatives related to AVATAR therapy project for EDs. Thus, their view and experience can be further considered in new developments and adaptations of the approach.

An additional limitation of the study is related to the research questions and the interview questions. In retrospect, it could be observed that the study did not include a clear research question that specifically focused on challenging aspects of the therapy or limitations of the approach. Furthermore, it could be noted how some of the interview questions were formulated could have been potentially leading for participants (e.g. assuming an impact or a positive view of therapy). More open-ended questions (on the line of the first questions) could have been helpful to explore participants' views of the therapy in a more open and flexible way.

4.4 Conclusion

The current study has provided an important contribution for the continued development and adaptation of AVATAR for EDs, by collecting, analysing, and interpreting qualitative data from participants who had taken part in the therapy. AVATAR therapy seems to have the potential of being a relevant and helpful approach in the field of ED, specifically AN. The externalisation of the disorder seems to be a key facilitator of the other treatment targets, such as working on values and identity and developing power and assertiveness over the voice. These factors represent important drivers of recovery in AN, with participants reporting an increase in self-compassion, behavioural changes and facilitated decision making around food, and an increase in motivation to recover. The current study has also provided a detailed account of the strengths and limitations of different aspects of the therapy delivery, highlighting the need for future research to trial adaptations in the number of sessions, involvement of parents or carers in the therapy, as well as narrower samples of participants to better understand optimal therapy delivery. EDs are disorders with a complex aetiology, which are often difficult to treat: developing innovative treatment such as the one applied in the current study is fundamental to improve service provision and the lives on individuals suffering from the condition.

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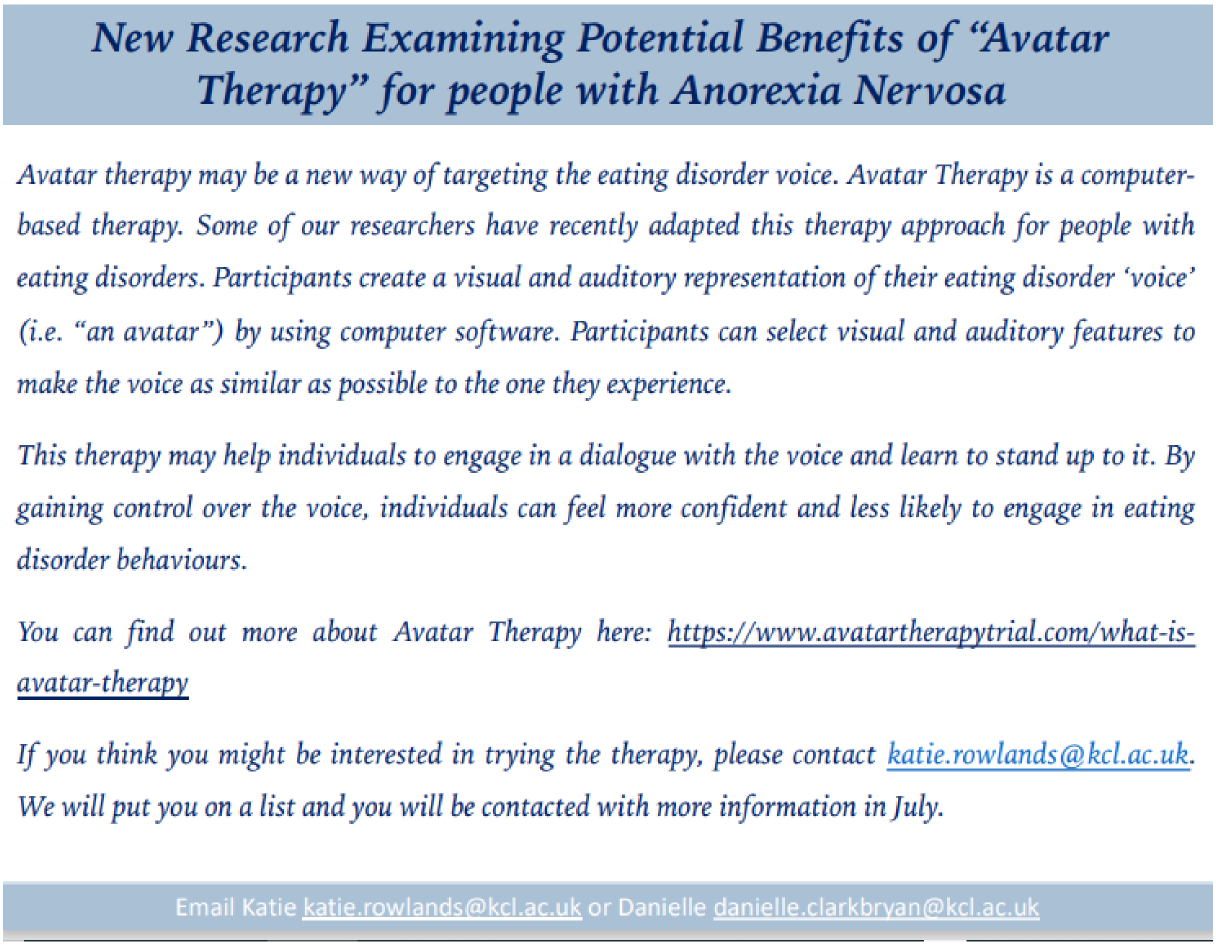
Appendix A – Eating Disorders newsletter study advert



New Research Examining Potential Benefits of "Avatar Therapy" for people with Anorexia Nervosa

Avatar therapy may be a new way of targeting the eating disorder voice. Avatar Therapy is a computer-based therapy. Some of our researchers have recently adapted this therapy approach for people with eating disorders. Participants create a visual and auditory representation of their eating disorder 'voice' (i.e. "an avatar") by using computer software. Participants can select visual and auditory features to make the voice as similar as possible to the one they experience.

This therapy may help individuals to engage in a dialogue with the voice and learn to stand up to it. By gaining control over the voice, individuals can feel more confident and less likely to engage in eating disorder behaviours.

You can find out more about Avatar Therapy here: https://www.avatartherapytrial.com/what-is-avatar-therapy

If you think you might be interested in trying the therapy, please contact katie.rowlands@kcl.ac.uk. We will put you on a list and you will be contacted with more information in July.

Email Katie katie.rowlands@kcl.ac.uk or Danielle danielle.clarkbryan@kcl.ac.uk

Appendix B – Participant Information Sheet

Feasibility and acceptability of AVATAR therapy in eating disorders
(Version 2, 28.05.2021, IRAS project number: 292346)

PARTICIPANT INFORMATION SHEET

We would like to invite you to take part in a research project. Before you decide to take part, we would like you to understand why the research is being done and what exactly would be involved.

Please take the time to read the following information sheet carefully and please ask any questions that you may have. If there is anything that is unclear or if you would like more information, please feel free to ask any member of our research team.

Background of the study

The National Institute of Care Excellence (NICE) guidelines highlighted the limited research into treatment for eating disorders and concluded the need of new approaches for this group of people. The use of new technologies may have promise for helping people with eating disorders. Many people with eating disorder report experiencing distressing thoughts or a distressing voice which is often call an 'eating disorder voice'. You may have your own name for these experiences. AVATAR therapy is one talking treatment which was developed to help people who hear distressing voices.

Aim of the study

We want to find out whether a talking therapy (AVATAR therapy) is helpful for people with eating disorders. We would also like to find out whether AVATAR therapy is feasible and acceptable to people receiving treatment for eating disorders. As part of the project we will be interested in asking you about your experience and feedback on this treatment.

Why have I been invited?

This project is for people who are receiving treatment for an eating disorder and who experience a distressing voice as part of their eating disorder, often called the "eating disorder voice".

Do I have to take part?

No. You don't have to participate. It is your decision as to whether or not you would like to participate. We will describe the study and go through this information sheet with you and also give you a copy to take away.

If you agree to take part, we will then ask you to sign a consent form to show that you have agreed to take part. Remember that you are still free to withdraw at any time, without giving a reason, after you have signed the consent form.

Important Point: Should you decide not to take part in this study or withdraw from the study, this will not affect your treatment in any way.

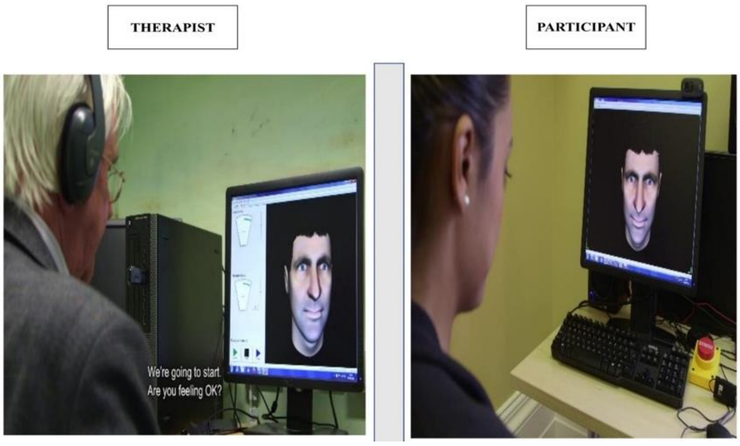
What will happen to me if I take part?

This project will be split in three stages. In stage 1, you will be asked complete some questionnaires online to assess the characteristics of the eating disorder voice, and eating disorder symptoms and mood. In stage 2, you will be asked take part in the AVATAR therapy which is described in more detail below. For this purpose, you will be asked to attend a series of sessions as well as complete a series of questionnaires, all of which **will take place online, in line with current COVID-19 guidelines.** You might also be invited to take part in an online interview to provide feedback about your experience of taking part in the study. Throughout stages 1 and 2 you will be invited to complete a brief survey to assess your experience of the eating disorder voice. In stage 3, you will be asked to repeat some online questionnaires to assess the characteristics of the eating disorder voice, and eating disorder symptoms and mood. When completing questionnaires in any of the three stages, you are welcome to take a break and return to the questionnaire at a later stage. You just need to keep the Qualtrics page open on your device. The process is described in detail as follows:

<u>Stage 1: Baseline assessment</u>

- This stage will last either two, three or four weeks depending on which group you are allocated to. Group allocation will be decided at random by a computer and no one can control the choice. The purpose of the randomisation is to ensure there is no bias in who is selected for each of the three baselines. The reason we have three different types of baseline is that it helps us to be more confident that any change or improvement in your eating disorder voice or symptoms we observe is related to the therapy rather than naturally occurring changes. The main different for you as a participant between the different baselines is how many weeks you'll need to complete weekly questionnaires before starting the AVATAR therapy.
- At the beginning of week 1, you will receive a link to the website Qualtrics and will be asked to complete the following four online questionnaires (45 min. approx.) as well as some demographic information (e.g. age; gender): Eating Disorder Examination Questionnaire; Depression Anxiety and Stress Scale; Beliefs about the Voice; and the Self-criticism and Self-compassion Scale. The questionnaires will ask about eating disorder symptoms, mood and self-compassion, and characteristics of the eating disorder voice and your relationship with it.

<u>Stage 2: AVATAR therapy sessions</u>



- AVATAR therapy involves the person creating an image or "avatar" of their eating disorder voice on a computer (see image to the right for an example). The therapist supports the person to speak confidently to the avatar; this can help them to feel less distressed by the voice in everyday life.
- AVATAR therapy involves 6-8 weekly sessions of approx. 50 minutes each, which include some time speaking with the avatar. The sessions will be delivered online either once or twice per week depending on the person's preference. A therapist will support you during these sessions to take power and control over within the conversations with the avatar. Each dialogue is recorded so that we can provide a copy of the dialogue for you to listen back to between sessions.
- After your last session you will be asked to complete the same questionnaires completed at baseline (Eating Disorder Examination Questionnaire; Depression Anxiety and Stress Scale; Beliefs about the Voice; and the Self-criticism and Self-compassion Scale), with the exception of the demographic questionnaire (40 min approx.). You will also have the option to take part in a one-hour interview asking about your experience of interacting with the avatar. This is optional.

Throughout stages 1 and 2, you will be asked to complete a brief survey to assess your experience of the eating disorder voice as well as the PSYRAT (Auditory Hallucination Subscale). These surveys will be available online, on Qualtrics. You will receive a link to it from the researchers.

Stage 3- Follow-up

- Four weeks after the end of the therapy, you will receive a link to Qualtrics, to complete the same questionnaires completed at baseline (Eating Disorder Examination Questionnaire; Depression Anxiety and Stress Scale; Beliefs about the Voice; and the Self-criticism and Self-compassion Scale) (approximately 40 minutes).

Only the researchers involved in the study will have access to the answers you provide in the study questionnaires. You can be assured that the data is confidential, and will be securely stored. The data generated by the study will be analysed at the Eating Disorders Research Unit, Department of Psychological Medicine, King's College London (103 Denmark Hill, Denmark Hill Campus) by the researchers. Data will be stored for 7 years according to the policies of King's College, London.

What are the possible disadvantages and risks of participating in this study?

Time and effort: Individuals enrolled in the study invest time and effort in this project. Set against this cost for you, are the possible benefits both for you and for future interventions in patients who suffer from an eating disorder. Currently, there is very little evidence about how to optimize treatment for eating disorders and thus, your participation is invaluable.

Exposure to AVATAR therapy: Previous pilot studies and one large-scale trial using avatar-based technologies in individuals with psychosis provided evidence that these interventions are acceptable and do not cause harm. Participants have reported positive experiences with this approach. Additionally, in the largest trial of AVATAR therapy in psychosis to date (150 people) there was no evidence of any adverse effects associated with the therapy.

Prior to AVATAR therapy, the researchers will give you detailed information and instructions about the study. During the sessions, regular checks on your experience of the interaction with the avatar will be made by the therapist, asking open questions, such as “How are you doing?”. You can stop the sessions at any point by pressing a “STOP” button and you will be free to withdraw from the study at any time without having to specify a reason.

In case you experience any adverse effect during the sessions (e.g. discomfort or anxiety), this will be discussed with the therapist to form a judgment about stopping or continuing the session. Serious adverse events will be monitored by the therapists. Additionally, if the therapists identify a risk to yourself or others (e.g. suicidal ideation, self-harming behaviour), they will contact your clinical team or report the event to your General Practitioner if you are not under the care of a clinical team at the time of your participation in the study.

Sensitive content of questionnaires: Previous studies have shown that there are no risks associated with the administration of the questionnaires used in this study. Nevertheless, since the questionnaires ask about various psychological factors, responding to such items may result in some distress. These relate to questions about the eating disorder and the eating disorder voice. You will be able to take breaks, as and when needed, in between answering questions. Also, you will be able to contact the study team at any time throughout the study. If you wish to interrupt your participation in the study at any time, you would be able to do so without providing any reasons.

Will I benefit from taking part?

Findings from previous scientific studies highlighted the critical need of developing new approaches for patients who suffer from an eating disorder, given the impact on individuals and families of this psychiatric disorder. Additionally, previous research conducted using AVATAR therapy has shown promising results in people experiencing distressing voices. During this study, you will be contributing to the assessment of an adapted version of the avatar-based approach that could potentially be beneficial to patients who suffer from Eating Disorders (ED). Your input in completing the questionnaires and qualitative interview will be very valuable for the study and you will be reimbursed for your participation. You will receive £20 to complete questionnaires at different timepoints (i.e. baseline, intervention and follow-up) for a total of £60. You will also receive £10 to take part in the qualitative interview at follow-up. All the payments will be Amazon vouchers. You can decide not to complete the questionnaires and interview, however you will not receive the vouchers.

<u>What if there is a problem?</u>

Any concern or complaint about the way you have been dealt with during the study, or any possible harm you might have suffered can be addressed to one of the researchers. If you remain unhappy and wish to complain formally, you can do this through the NHS Complaints Procedure. Complaints should be addressed to Dr Gill Dale for research in SLaM Director of Research Quality; Head, Joint R&D Office of South London and Maudsley NHS Foundation Trust and Institute of Psychiatry, Psychology & Neuroscience (IoPPN), P005, Institute of Psychiatry, Psychology & Neuroscience (IoPPN), King's College London, De Crespigny Park, London SE5 8AF.

In the unlikely case of you losing the capacity to take part, you will be withdrawn from the study. We will retain the data collected up to that point for data analysis.
In the unlikely event that something does go wrong and you are harmed during the research and this is due to someone's negligence, then you may have grounds for a legal action for compensation against the South London and Maudsley NHS Foundation Trust but you may have to pay your legal costs. The normal National Health Service complaints mechanisms will still be available to you.

In the event that you find parts of the study upsetting you are welcome to speak to Prof Janet Treasure who is a member of the research team and/or to Dr Valentina Cardi, who is a clinical psychologist. Both have over 10 years of experience in working with people with eating disorders. You can also contact the local Patient Advice and Liaison Service (PALS) for support and advice (PALS Maudsley Hospital, Tel. 0800 731 2864). You will be able to interrupt your participation in the study without providing any reasons, should you wish to do so.

In the event that something does go wrong and you are harmed during the research you may have grounds for legal action for compensation against King's College London and/or SLaM NHS Foundation Trust, but you may have to pay your legal costs. The normal National Health Service complaints mechanisms will still be available to you (if appropriate). King's College London has obtained insurance which provides no-fault compensation i.e. for non-negligent harm, you may be entitled to make a claim for this.

<u>Will my participation be kept confidential?</u>

Yes. We will follow ethical and legal practice and all information about you will be handled in confidence. The data of this study will be anonymised and coded. The electronic and recorded data will be stored on university computers, which are all password protected. Paper data will be stored in locked cabinets at the Eating Disorders Unit at the Institute of Psychiatry. Only researchers involved in this study and regulatory authorities will have access to the data.
All information that is collected during the course of the research will be kept strictly confidential according to the Data Protection Act 1998.

How we will handle your data

We will need to use information from you for this research project. This information will include your initials, name, date of birth, contact details. People will use this information to do the research or to check your records to make sure that the research is being done properly.

People who do not need to know who you are will not be able to see your name or contact details. Your data will have a code number instead. We will keep all information about you safe and secure.

Once we have finished the study, we will keep some of the data so we can check the results. We will write our reports in a way that no-one can work out that you took part in the study.

What are your choices about how your information is used?

- You can stop being part of the study at any time, without giving a reason, but we will keep information about you that we already have.
- We need to manage your records in specific ways for the research to be reliable. This means that we won't be able to let you see or change the data we hold about you.
- We are seeking consent for pseudonymised material from the therapy sessions to be used for the purpose of dissemination. This material (audio/ video recording and written transcripts) will be stored securely on University computers. **This is completely optional. Your decision will not affect your involvement in the study in any way.**

Where can you find out more about how your information is used?

You can find out more about how we use your information

- at www.hra.nhs.uk/information-about-patients/
- by asking one of the research team
- by contacting King's College London's Data Protection Officer, Mr Albert Chan at info-compliance@kcl.ac.uk (or if SLaM is storing the research data, dataprotectionoffice@slam.nhs.uk)

Under which circumstances will confidentiality be breached by the research team?

If any disclosures are made about harming yourself or others, or if any new issues related to your psychological and/or physical health which were unknown before come up during the study, your clinical care team will be informed about this. If you are not under the care of a clinical team at the time of your participation in the study, then your General Practitioner will be informed instead.

If any disclosures are made about any criminal activity, confidentiality will have to be breached and the relevant authorities will have to be contacted.

What if new information becomes available?

If new information about the treatment that is being studied becomes available, you will be informed about this.

What if I don't want to carry on with the study?

You can withdraw from the study at any time. If you decide to withdraw from the study, we will retain the data collected up to that point for data analysis. **It is also of importance for you to know that, if you decide to withdraw from the study, this will not affect your treatment in any way.**

Will my General Practitioner (GP) be involved?

Your GP will be contacted only in the case of significant adverse effects which, in our experience is unlikely, and/or if you disclose risks of harming yourself and/or others.

What will happen to the results of the research study?

You will be offered the opportunity to be informed about the results once the data for all participants are collected and analysed. The results of the study will be sent to a medical journal for publication. Your participation in the study will, of course, not be disclosed.

Which technology does the avatar therapy use and who created this software?

The therapy software uses computer technology developed by the Speech, Hearing & Phonetic Sciences Department at University College London. An agreement between King´s College London (KCL) and University College London (UCL) is in place in order to obtain authorisation of the use of this software for the present study and also technical support for the use of the avatar-based VR system. Patient information will not be disclosed in any case. A written report of the main research outcomes and of the use of the software will be provided by KCL at the end of the study.

Who is organising and funding this research?

This study is funded by the Psychiatry Research Trust and the British Academy/Leverhulme Small Grant.

Who has reviewed this study?

All research in the NHS is looked at by an independent group of people, called a Research Ethics Committee, to protect your interests. This study has been reviewed and given favourable opinion by ________________Research Ethics Committee.

Further information about the study and contact details:

You should feel free to ask any questions regarding the study and your participation in it. Please get in touch if there is anything that you would like clarification on.

General information about this research project can be obtained from: Chiara Calissano (chiara.calissano@kcl.ac.uk), Alistair Thompson (Alistair.Thompson@kcl.ac.uk) Professor Janet Treasure (janet.treasure@kcl.ac.uk) Dr. Valentina Cardi (valentina.cardi@kcl.ac.uk), Dr Thomas Ward (thomas.ward@kcl.ac.uk), Professor Janet Treasure (janet.treasure@kcl.ac.uk).

Thank you for reading the information sheet

Appendix C – Consent Form

PATIENT CONSENT FORM V1 (23.04.2021)

IRAS Project ID: 292346

Participant Identification Number: _________

Full title of study: AVATAR therapy to reduce the power of the eating disorder voice in eating disorders: collaborative development and feasibility testing

Short title of the study: Feasibility and acceptability of AVATAR therapy in eating disorders.

Name of Researchers: Miss Chiara Calissano, Mr Alistair Thompson, Dr Thomas Ward, Professor Janet Treasure, and Dr Valentina Cardi

Please read and initial the boxes:

- I confirm that I have read and understand the information sheet for the above study (Patient Information Sheet, Version 2, 28.05.2021). I have had the opportunity to consider the information, ask questions and have had these answered satisfactorily. I understand that this is a feasibility study. ☐

- I understand that my participation is voluntary and that I am free to withdraw at any time without giving any reason, without my medical care or legal rights being affected. ☐

- I understand that during social distancing restrictions in place due to the Covid-19 global pandemic, the study is conducted remotely as outlined in the information sheet. ☐

- I understand that I will have to provide my email address in order to allow registration on the study and complete the study questionnaires, as well as for researchers to contact me to join the remote therapy sessions. ☐

- I understand that once the study ends, I will receive a departmental newsletter. This will describe the main results of the project. I will be able to request further details of the study results if I wish to. ☐

- I understand that researchers are legally bound to report any potential risk to harm myself or others to my clinical team or General Practitioner, in case I am not under the care of a clinical team. ☐
- I agree to take part in the above study. ☐
- I give consent to audio record the avatar dialogue. ☐
- I give consent to video record the sessions (this is optional). ☐

Complete if taking part in the interview at the end of therapy:

- I consent to videorecord the interview and for written quotes to be used with no confidential information (optional) ☐

Name of Participant____

Email address____

Telephone number____

GP address:____

Signature ____

Name of Person taking consent ____

Date____

Signature ____

Appendix D – Demographic questionnaire

AVATAR therapy for anorexia nervosa
(Version 1; 26/11/2020 IRAS project number: 292346)

Demographic Questionnaire

Sex: Male ☐ Female ☐ **Age:** ____

Is English your first language? Yes / No

What is your ethnicity? ....

What is the highest level of education you completed?

☐ No qualifications
☐ O Level / GCSE
☐ A Level / NVQ
☐ Diploma / BTEC
☐ University Degree
☐ Postgraduate degree
☐ Other………..

How many years of education have you received? ………………………………..

What is your marital status?

○ Married
○ Living together
○ Single
○ Divorced
○ Separated
○ Widowed

How many children do you have (if any)?

a) No. of daughters: _____ b) their ages: ____; ____; ____; ____; ____

c) No. of sons: _____ d) their ages: ____; ____; ____; ____;

Has anyone in your family been diagnosed with an Eating Disorder? Yes/No

If yes, please give details..

Has anyone in your family been diagnosed with any psychological problem or mental illness? Yes/No

If yes, please give details..

What is your current employment status?

☐ Full time

☐ Part time

☐ Unemployed

☐ Student

☐ Retired

☐ Sick leave

☐ House wife / husband

☐ Other…………….(please specify)

For how many years have you had an eating disorder?

______________________ years

What is the highest weight you have ever been?

______________________ Kilograms

What is the lowest weight you have ever been?

______________________ Kilograms

What is your current weight?

______________________ Kilograms

What is your height?

____

Have you had to take time off from school or work due to your eating disorder? Yes/No

If yes, how long in months in total?

………………………………………………………………………………………………………

Have you been treated in the past using the Mental Health Act? Yes/no

If Yes, was this 3-5 days ☐ one month ☐ six months ☐

How many times for each? ……………………………………………….

……………………………………………………………………………………

……………………………………………………………………………………

Have you been treated using a Community Treatment Order (CTO)? Yes/no

If yes, please give us the dates of each CTO:

……………………………………………………………………………………

……………………………………………………………………………………

Do you currently have any other psychiatric diagnoses other than your eating disorder?

Yes / No

If yes, which one?

Depression ☐
Anxiety ☐
Obsessive compulsive disorder ☐
ADHD ☐
Autistic spectrum disorder ☐
Panic ☐
Phobia ☐

Other, please give details

………………………………………………………………

Do you currently have any other medical diagnoses? Yes / No

If yes, which one?

Diabetes ☐
Inflammatory bowel disease ☐
Coeliac disease ☐

Other, please give details

…………………………………………………………………

Are you currently receiving any medication for psychiatric difficulties? Yes / No

Major tranquilizer (e.g. olanzapine, quetiapine) …………………………………

Antidepressant (fluoxetine, sertraline etc.)

Anti-anxiety (valium, or other benzodiazepines, prochlophenazine)

Mood stabilisers (lithium, carbamazepine, lamotrigine etc)

Other ……………………………………..

Are you currently receiving any medication for physical problem? Yes / No

If yes, please give details what and what for:

Appendix E – Eating Disorder Examination Questionnaire

Feasibility and acceptability of AVATAR therapy in eating disorders.
Patient questionnaire 1

(Version 1; 23/04/2021, IRAS Project ID: 292346)

Eating Disorder Examination Questionnaire (EDE-Q)

Instructions: The following questions are concerned with the past four weeks (28 days) only.

Please read each question carefully. Please answer all the questions. Thank you.

Questions 1 to 12: Please circle the appropriate number on the right. Remember that the questions only refer to the past four weeks (28 days) only.

On how many of the past 28 days…..	**No days**	**1-5 days**	**6-12 days**	**13-15 days**	**16-22 days**	**23-27 days**	**Every day**
1. Have you been deliberately trying to limit the amount of food you eat to influence your shape or weight (whether or not you have succeeded)?	0	1	2	3	4	5	6
2. Have you gone for long periods of time (8 waking hours or more) without eating anything at all in order to influence your shape or weight?	0	1	2	3	4	5	6
3. Have you tried to exclude from your diet any foods that you like in order to influence your shape or weight (whether or not you have succeeded)?	0	1	2	3	4	5	6
4. Have you tried to follow definite rules regarding your eating (for example, a calorie limit) in order to influence your shape or weight (whether or not you have succeeded)?	0	1	2	3	4	5	6
5. Have you had a definite desire to have an empty stomach with the aim of influencing your shape or weight?	0	1	2	3	4	5	6
6. Have you had a definite desire to have a totally flat stomach?	0	1	2	3	4	5	6
7. Has thinking about food, eating or calories made it very	0	1	2	3	4	5	6

difficult to concentrate on things you are interested in (for example, working, following a conversation, or reading)?							
8. Has thinking about shape or weight made it very difficult to concentrate on things you are interested in (for example, working, following a conversation, or reading)?	0	1	2	3	4	5	6
9. Have you had a definite fear of losing control overeating?	0	1	2	3	4	5	6
10. Have you had a definite fear that you might gain weight?	0	1	2	3	4	5	6
11. Have you felt fat?	0	1	2	3	4	5	6
12. Have you had a strong desire to lose weight?	0	1	2	3	4	5	6
13. Over the past 28 days, how many times have you eaten what other people would regards as an unusually large amount of food (given the circumstances)?	0	1	2	3	4	5	6
14. On how many of these times did you have a sense of having lost control over your eating (at the time you were eating)?	0	1	2	3	4	5	6
15. Over the past 28 days, on how many DAYS have such episodes of overeating occurred (i.e. you have eaten an unusually large amount of food and have had a sense of loss of control at the time)?	0	1	2	3	4	5	6
16. Over the past 28 days, how many times have you made yourself sick (vomit) as a means of controlling your shape or weight?	0	1	2	3	4	5	6
17. Over the past 28 days, how many times have you taken laxatives as a means of controlling your shape or weight?	0	1	2	3	4	5	6

18. Over the past 28 days, how many times have you exercised in a “driven” or “compulsive” way as a means of controlling your weight, shape or amount of fat, or to burn off calories?	0	1	2	3	4	5	6

Questions 19 to 21: Please circle the appropriate number. Please note that for these questions the term “binge eating” means eating what others would regard as an unusually large amount of food for the circumstances, accompanied by a sense of having lost control over eating.

On how many of the past 28 days…..	**No days**	**1-5 days**	**6-12 days**	**13-15 days**	**16-22 days**	**23-27 days**	**Every day**
19. How many days have you eaten in secret (i.e. furtively)? … Do not count episodes of binge eating.	0	1	2	3	4	5	6
	None of the times	A few of the times	Less than half	Half of the times	More than half	Most of the time	Every time
20. On what proportion of the times that you have eaten have you felt guilty (felt that you’ve done wrong) because of its effect on your shape or weight? … Do not count episodes of binge eating.	0	1	2	3	4	5	6
	Not at all		Slightly		Moderately		Markedly
21. Over the past 28 days, how concerned have you been about other people seeing you eat? … Do not count episodes of binge eating.	0	1	2	3	4	5	6
22. Has your weight influenced how you think about (judge) yourself as a person?	0	1	2	3	4	5	6
23. Has your shape influenced how you think about (judge) yourself as a person?	0	1	2	3	4	5	6
24. How much would it have upset you if you had been asked to weigh yourself once a week (no more, or less,	0	1	2	3	4	5	6

often) for the next four weeks?							
25. How dissatisfied have you been with your weight?	0	1	2	3	4	5	6
26. How dissatisfied have you been with your shape?	0	1	2	3	4	5	6
27. How uncomfortable have you felt seeing your body (for example, seeing your shape in the mirror, in a shop window reflection, while undressing or taking a bath or shower)?	0	1	2	3	4	5	6
28. How uncomfortable have you felt about others seeing your shape or figure (for example, in communal changing rooms, when swimming, or wearing tight clothes)?	0	1	2	3	4	5	6

Appendix F - Depression Anxiety and Stress Scale

Feasibility and acceptability of AVATAR therapy in eating disorders.
Patient questionnaire 5, V1, 26.11.2020

(Version 1; 23.04.2021, IRAS Project ID: 292346)

Depression, Anxiety and Stress Scale (DASS21)

For each statement below, please circle the number in the column that best represents how you have been feeling in the last week.

Statement	Did not apply to me at all	Applied to me some degree or some of the time	Applied to me a considerable degree or a good part of the time	Applied to me very much or most of the time
1. I found it hard to wind down	0	1	2	3
2. I was aware of dryness of my mouth	0	1	2	3
3. I couldn't seem to experience any positive feeling at all	0	1	2	3
4. I experienced breathing difficulty (eg, excessively rapid breathing, breathlessness in the absence of physical exertion)	0	1	2	3
5. I found it difficult to work up the initiative to do things	0	1	2	3
6. I tended to over-react to situations	0	1	2	3
7. I experienced trembling (eg, in the hands)	0	1	2	3
8. I felt that I was using a lot of nervous energy	0	1	2	3
9. I was worried about situations in which I might panic and make a fool of myself	0	1	2	3
10. I felt that I had nothing to look forward to	0	1	2	3

11. I found myself getting agitated	0	1	2	3
12. I found it difficult to relax	0	1	2	3
13. I felt down-hearted and blue	0	1	2	3
14. I was intolerant of anything that kept me from getting on with what I was doing	0	1	2	3
15. I felt I was close to panic	0	1	2	3
16. I was unable to become enthusiastic about anything.	0	1	2	3
17. I felt I wasn't worth much as a person	0	1	2	3
18. I felt that I was rather touchy	0	1	2	3
19. I was aware of the action of my heart in the absence of physical exertion (eg, sense of heart rate increase, heart missing a beat)	0	1	2	3
20. I felt scared without any good reason.	0	1	2	3
21. I felt that life was meaningless	0	1	2	3

Appendix G - Beliefs about the Voice Questionnaire

Feasibility and acceptability of AVATAR therapy in eating disorders.
Patient questionnaire 3, V1, 23.04.2021, IRAS Project number 292346

Beliefs about the Voices Questionnaire- Revised (BAVQ-R)

This measure contains questions about the thoughts experienced by people regarding weight, shape and eating. Please answer the following questions based on the thoughts you have experienced in the last week.

Thank you for your help.

My thoughts about weight, shape and eating…					
1	**Punish me**	**Disagree**	**Unsure**	**Slightly agree**	**Strongly agree**
2	**Want to help me**				
3	**Are very powerful**				
4	**Persecute me for no good reason**				
5	**Want to protect me**				
6	**Seem to know everything about me**				
7	**Are evil**				
8	**Help to keep me sane**				
9	**Make me do things I really don't want to do**				
10	**Want to harm me**				
11	**Help me to develop special powers or abilities**				
12	**Are uncontrollable**				
13	**Want me to do bad things**				
14	**Help me to achieve my goal in life**				
15	**Will harm or kill me if I disobey or resist them**				
16	**Try to corrupt or destroy me**				
17	**Are something I am grateful for**				
18	**Rule my life**				
19	**Reassure me**				
20	**Frighten me**				
21	**Make me happy**				
22	**Make me feel down**				
23	**Make me feel angry**				
24	**Make me feel calm**				
25	**Make me feel anxious**				
26	**Make me feel confident**				

When I have these thoughts…

27	**I tell them (in my own thoughts) to leave me alone**				

28	**I try and take my mind off them**				
29	**I try and stop them**				
30	**I do things to prevent them being loud**				
31	**I am reluctant to act on them**				
32	**I listen and pay attention to them because I want to**				
33	**I willingly act on them**				
34	**I have done things to start acting on them**				

Appendix H - Self-criticism and Self-compassion Scale

Feasibility and acceptability of AVATAR therapy in eating disorders.
Patient questionnaire 4

(Version 1; 23.04.2021, IRAS Project ID: 292346)

Self-Criticism and Self-Compassion Scale (SCCS)

Below are several statements describing various situations. Accompanying each statement is a list of possible reactions that you may have in response to **yourself** during these situations. We would like you to rate on the scales the extent to which you would react to **yourself** in a specific manner in response to each situation, *as if the situation were happening to you at this moment in time*. Try to imagine each situation occurring as vividly as possible.

1) **"You arrive home to find that you have left your keys at work"**

	Not at all						Highly
Reassuring	1	2	3	4	5	6	7
Soothing	1	2	3	4	5	6	7
Contemptuous	1	2	3	4	5	6	7
Compassionate	1	2	3	4	5	6	7
Critical	1	2	3	4	5	6	7
Harsh	1	2	3	4	5	6	7

2) **"You receive a letter in the post that is an unpaid bill reminder"**

	Not at all						Highly
Reassuring	1	2	3	4	5	6	7
Soothing	1	2	3	4	5	6	7
Contemptuous	1	2	3	4	5	6	7
Compassionate	1	2	3	4	5	6	7
Critical	1	2	3	4	5	6	7
Harsh	1	2	3	4	5	6	7

3) **"You have just dropped and scratched your new Smartphone"**

	Not at all						Highly
Reassuring	1	2	3	4	5	6	7
Soothing	1	2	3	4	5	6	7
Contemptuous	1	2	3	4	5	6	7
Compassionate	1	2	3	4	5	6	7
Critical	1	2	3	4	5	6	7
Harsh	1	2	3	4	5	6	7

4) **"You have just opened the washing machine door to find that your white wash has turned pink"**

	Not at all						Highly
Reassuring	1	2	3	4	5	6	7
Soothing	1	2	3	4	5	6	7
Contemptuous	1	2	3	4	5	6	7

Compassionate	1	2	3	4	5	6	7
Critical	1	2	3	4	5	6	7
Harsh	1	2	3	4	5	6	7

5) “After searching your bag you realise that you have lost a £20 note”

	Not at all						Highly
Reassuring	1	2	3	4	5	6	7
Soothing	1	2	3	4	5	6	7
Contemptuous	1	2	3	4	5	6	7
Compassionate	1	2	3	4	5	6	7
Critical	1	2	3	4	5	6	7
Harsh	1	2	3	4	5	6	7

Appendix I - Psychotic Symptom Rating Scales

AVATAR therapy for eating disorders
Patient questionnaire 2, V1, 23.04.2021, IRAS N. 292346

PSYCHOTIC SYMPTOM RATING SCALES (PSYRAT)

Auditory hallucinations Sub-scale

1 Frequency

How often do you experience voices (every day/ all day long)?

0	1	2	3	4
Voices not present or present less than once a week	Voices occur for at least once a week	Voices occur at least once a day	Voices occur at least once an hour	Voices occur continuously or almost continuously i.e. stop for only a few seconds or minutes

2 Duration

When you hear voices, how long do they last e.g. few seconds, minutes, hours all day long?

0	1	2	3	4
Voices not present	Voices last for a few seconds, fleeting voices	Voices last for several minutes	Voices last for at least one hour	Voices last for hours at a time

3 Location

When you hear your voices where do they sound like they're coming from? Is it inside of your head and/ or outside? If voices sound like they are outside your head, whereabouts do they sound like they're coming from?

0	1	2	3	4
Voices not present	Voices sound like they are inside head only	Voices outside the head, but close to ears or head.	Voices sound like they are inside or close to ears and outside head away from ears	Voices sound like they are from outside the head only

4 Loudness

How loud are your voices? Are they louder than your voice, about the same loudness, quieter or just a whisper?

0	1	2	3	4

Voices not present	Quieter than my own voice, whispers	About same loudness as my own voice	Louder than my own voice	Extremely loud, shouting

5 Beliefs re-origin of voices

What do you think has caused your voices? Are the voices caused by factors related to yourself or solely due to other people or factors?

0	**1**	**2**	**3**	**4**
Voices not present	Voices are solely internally generated and related to me	I believe at less than 50% conviction that voices originate from external causes	I believe at 50% or more conviction (but less than 100%) that voices originate from external cause	I believe voices are solely due to external causes, 100% conviction

6 Amount of negative content of voices Do your voices say unpleasant or negative things? How much of the time do the voices say these types of unpleasant or negative items?

0	**1**	**2**	**3**	**4**
No unpleasant content	Occasional unpleasant content	Minority of voice content is unpleasant or negative (<50%)	Majority of voice content is unpleasant or negative (≥50%)	All of voice content is unpleasant or negative

7 Degree of negative content- How much of the content of the voice is negative?

0	**1**	**2**	**3**	**4**
No unpleasant content	Some degree of negative content, but not personal comments relating to myself or my family e.g. swear words or comments not directed to self, e.g. `the milkman's ugly'	Personal verbal abuse, comments on behaviour e.g. `shouldn't do that or say that'	Personal verbal abuse relating to self-concept e.g. `you're lazy, ugly, mad, perverted'	Personal threats to self-e.g. threats to harm myself or my family, extreme instructions or commands to harm self or others

8 Amount of distress

Are your voices distressing? How much of the time?

0	**1**	**2**	**3**	**4**
Voices not distressing at all	Voices occasionally	Equal amounts of distressing	Majority of voices	Voices always distressing

	distressing, but majority not distressing	and non-distressing voices	distressing, minority not distressing	

9 Intensity of distress

When voices are distressing, how distressing are they? Do they cause you minimal, moderate, severe distress? Are they the most distressing they have ever?

0	1	2	3	4
Voices not distressing at all	Voices slightly distressing	Voices are distressing to a moderate degree	Voices are very distressing, although I could feel worse	Voices are extremely distressing, I feel the worst I could possibly feel

10 Disruption to life caused by voices

How much disruption do the voices cause to your life? Do they prevent you from working or carrying out a daytime activity? Do they interfere with your relationships with family or friends? Do they interfere with your ability to look after yourself (washing/ changing clothes)?

0	1	2	3	4
No disruption to my life, I am able to maintain independent living. No problems in daily living skills. I am able to maintain social and family relationships (if present)	Voices cause minimal amount of disruption my to life e.g. interferes with my concentration. I am able to maintain daytime activity and social and family relationships. I am able to maintain independent living without support.	Voices cause moderate amount of disruption to my life. Some disturbance to my daytime activity and or family/ social activities.	Voices cause severe disruption to life so that hospitalization is usually necessary. I am able to maintain some daily activities, self-care and relationships whilst in hospital. I am in supported accommodation, but experiencing severe disruption to my life in terms of activities daily living skills and or relationships.	Voices cause complete disruption of daily life requiring hospitalization. I am unable to maintain and daily activities and social relationships.

11 Controllability of voices

Do you think you have any control over when your voices happen? Can you dismiss or bring on your voices?

0	**1**	**2**	**3**	**4**
I believe that I can have control over my voices and can bring on or dismiss them at my will	I believe that I can have some control over my voices on the majority of occasions	I believe that I can have some control over my voices approximately half of the time	I believe that I can have some control over my voices but only occasionally.	I have no control over when the voices occur and cannot dismiss or bring them on at all

Appendix J – Qualitative Interview Schedule

Interview schedule AVATAR therapy case series – November 2021

How did you find the experience of Avatar Therapy overall?

How did it work for you to receive the therapy remotely?

What did motivate you to take part?

How did the dialogue with the AVATAR influence your understanding of the eating disorder voice?

How did the dialogue with the AVATAR influence your relationship with the eating disorder voice?

How did the therapy impact on your eating disorder?

What do you think about the impact of the therapy at a different stage of recovery?

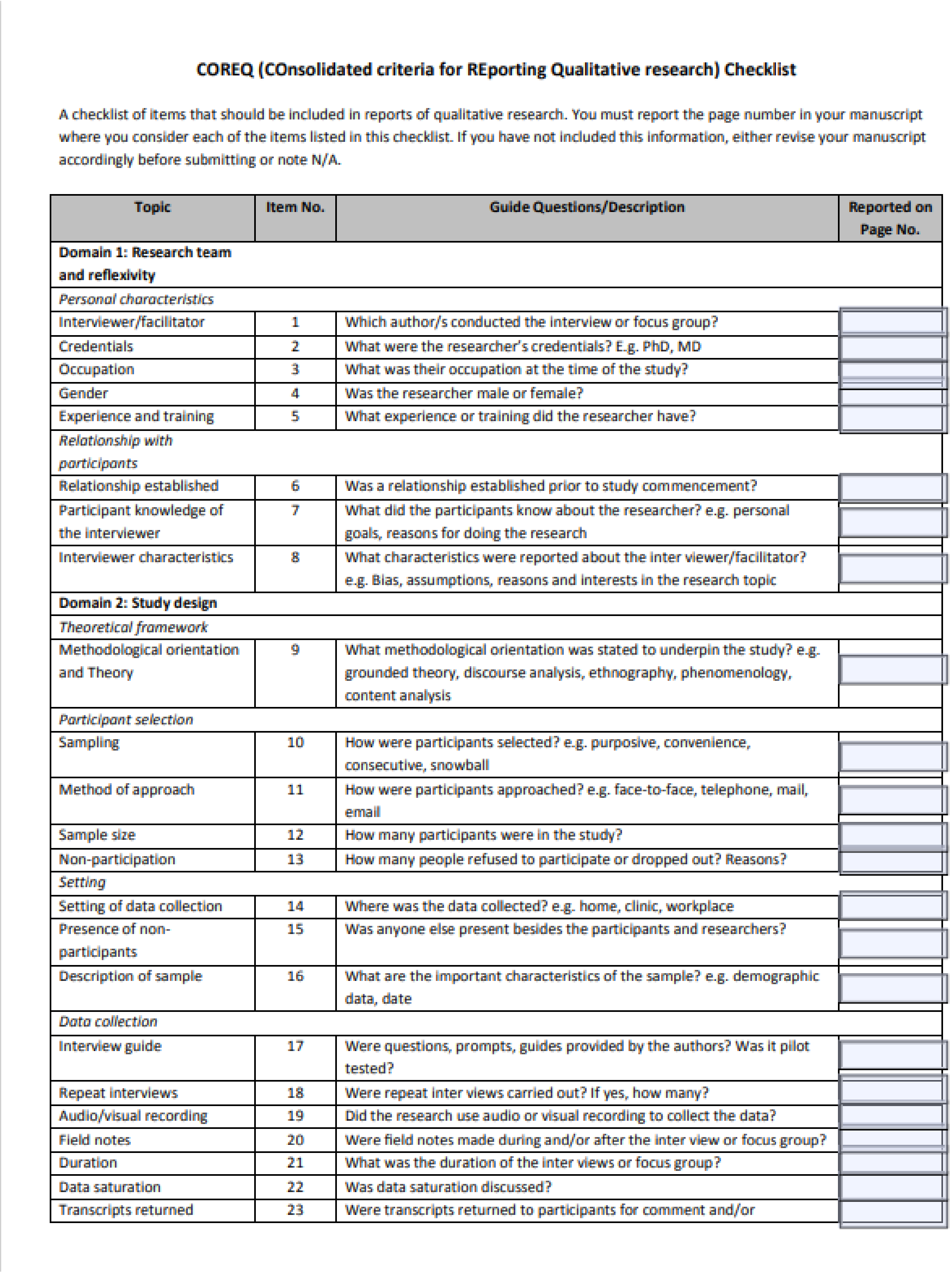
How did the therapy impact on how you see yourself in the recovery process?

How does AVATAR therapy compare to other treatments you have received?

How would you change AVATAR therapy to support yourself in recovery?

How do you think significant others could be involved in AVATAR therapy?

Appendix K Consolidated Criteria for Reporting Qualitative Research Checklist (COREQ)



COREQ (COnsolidated criteria for REporting Qualitative research) Checklist

A checklist of items that should be included in reports of qualitative research. You must report the page number in your manuscript where you consider each of the items listed in this checklist. If you have not included this information, either revise your manuscript accordingly before submitting or note N/A.

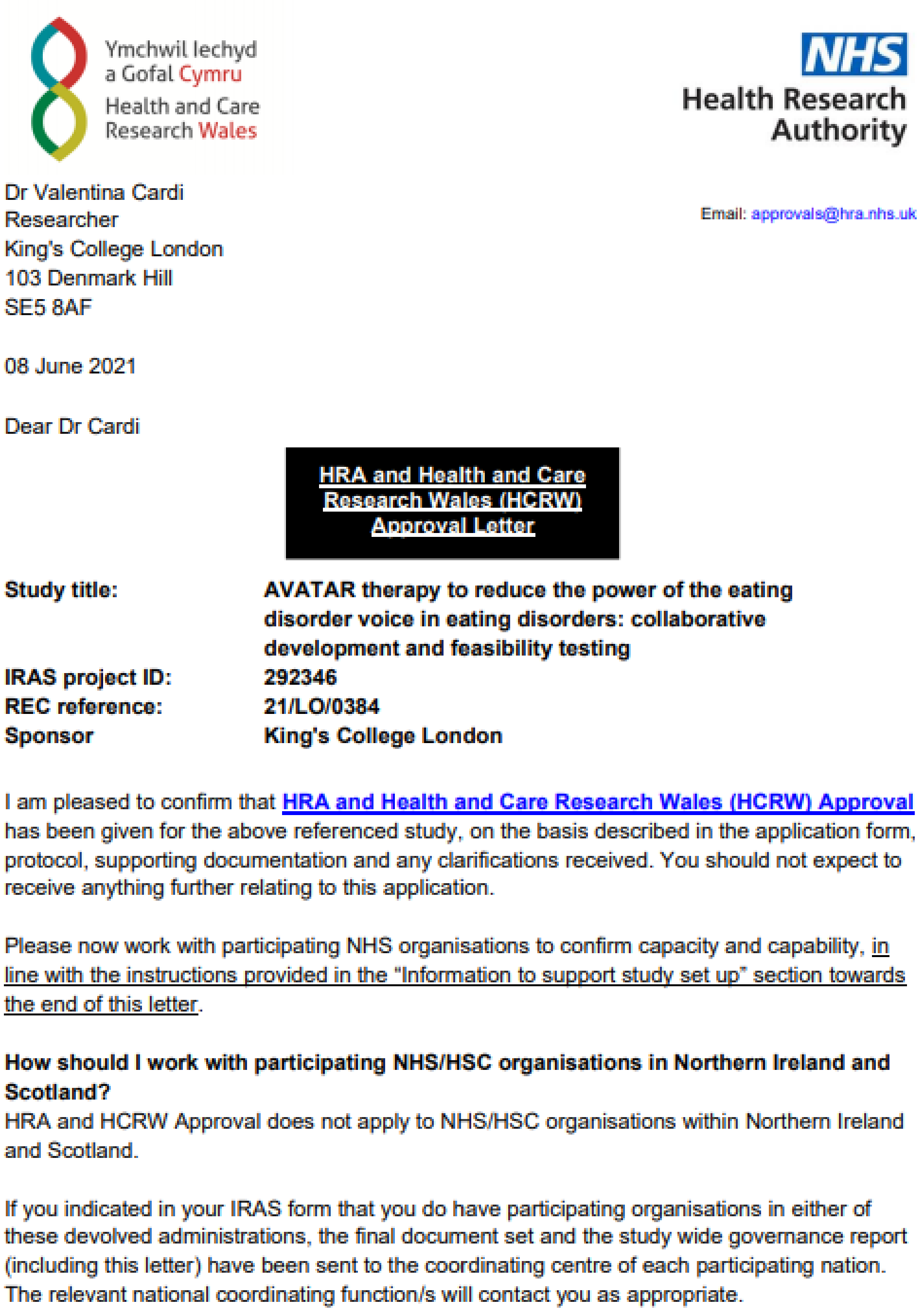
Topic	Item No.	Guide Questions/Description	Reported on Page No.
Domain 1: Research team and reflexivity			
Personal characteristics			
Interviewer/facilitator	1	Which author/s conducted the interview or focus group?	
Credentials	2	What were the researcher's credentials? E.g. PhD, MD	
Occupation	3	What was their occupation at the time of the study?	
Gender	4	Was the researcher male or female?	
Experience and training	5	What experience or training did the researcher have?	
Relationship with participants			
Relationship established	6	Was a relationship established prior to study commencement?	
Participant knowledge of the interviewer	7	What did the participants know about the researcher? e.g. personal goals, reasons for doing the research	
Interviewer characteristics	8	What characteristics were reported about the inter viewer/facilitator? e.g. Bias, assumptions, reasons and interests in the research topic	
Domain 2: Study design			
Theoretical framework			
Methodological orientation and Theory	9	What methodological orientation was stated to underpin the study? e.g. grounded theory, discourse analysis, ethnography, phenomenology, content analysis	
Participant selection			
Sampling	10	How were participants selected? e.g. purposive, convenience, consecutive, snowball	
Method of approach	11	How were participants approached? e.g. face-to-face, telephone, mail, email	
Sample size	12	How many participants were in the study?	
Non-participation	13	How many people refused to participate or dropped out? Reasons?	
Setting			
Setting of data collection	14	Where was the data collected? e.g. home, clinic, workplace	
Presence of non-participants	15	Was anyone else present besides the participants and researchers?	
Description of sample	16	What are the important characteristics of the sample? e.g. demographic data, date	
Data collection			
Interview guide	17	Were questions, prompts, guides provided by the authors? Was it pilot tested?	
Repeat interviews	18	Were repeat inter views carried out? If yes, how many?	
Audio/visual recording	19	Did the research use audio or visual recording to collect the data?	
Field notes	20	Were field notes made during and/or after the inter view or focus group?	
Duration	21	What was the duration of the inter views or focus group?	
Data saturation	22	Was data saturation discussed?	
Transcripts returned	23	Were transcripts returned to participants for comment and/or	

Topic	Item No.	Guide Questions/Description	Reported on Page No.
		correction?	
Domain 3: analysis and findings			
Data analysis			
Number of data coders	24	How many data coders coded the data?	
Description of the coding tree	25	Did authors provide a description of the coding tree?	
Derivation of themes	26	Were themes identified in advance or derived from the data?	
Software	27	What software, if applicable, was used to manage the data?	
Participant checking	28	Did participants provide feedback on the findings?	
Reporting			
Quotations presented	29	Were participant quotations presented to illustrate the themes/findings? Was each quotation identified? e.g. participant number	
Data and findings consistent	30	Was there consistency between the data presented and the findings?	
Clarity of major themes	31	Were major themes clearly presented in the findings?	
Clarity of minor themes	32	Is there a description of diverse cases or discussion of minor themes?	

Developed from: Tong A, Sainsbury P, Craig J. Consolidated criteria for reporting qualitative research (COREQ): a 32-item checklist for interviews and focus groups. *International Journal for Quality in Health Care*. 2007. Volume 19, Number 6: pp. 349 – 357

Once you have completed this checklist, please save a copy and upload it as part of your submission. DO NOT include this checklist as part of the main manuscript document. It must be uploaded as a separate file.

Appendix L – NHS HRA Ethics Approval



Ymchwil Iechyd
a Gofal Cymru
Health and Care
Research Wales

NHS
Health Research
Authority

Email: approvals@hra.nhs.uk

Dr Valentina Cardi
Researcher
King's College London
103 Denmark Hill
SE5 8AF

08 June 2021

Dear Dr Cardi

HRA and Health and Care Research Wales (HCRW) Approval Letter

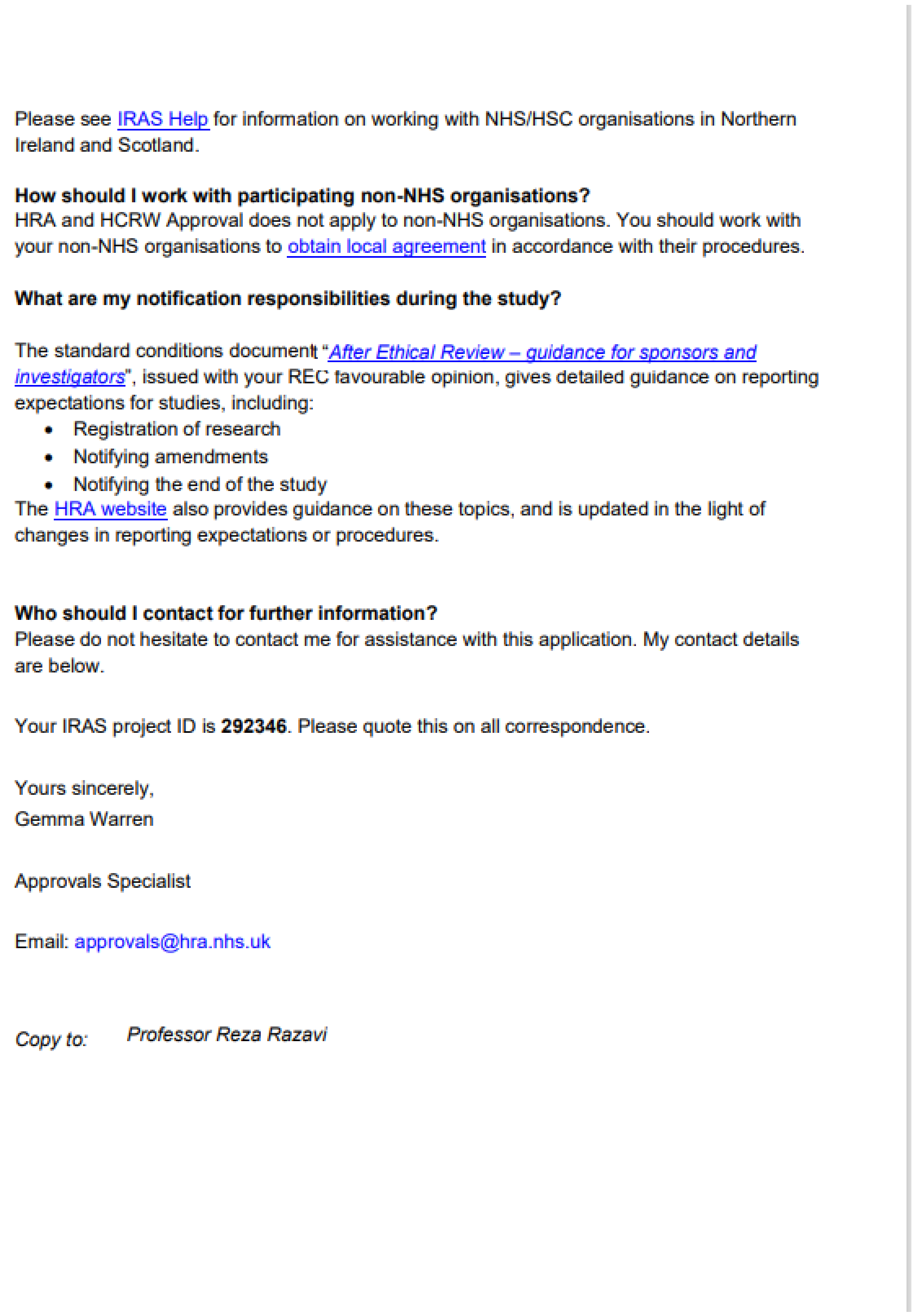
Study title:	**AVATAR therapy to reduce the power of the eating disorder voice in eating disorders: collaborative development and feasibility testing**
IRAS project ID:	**292346**
REC reference:	**21/LO/0384**
Sponsor	**King's College London**

I am pleased to confirm that HRA and Health and Care Research Wales (HCRW) Approval has been given for the above referenced study, on the basis described in the application form, protocol, supporting documentation and any clarifications received. You should not expect to receive anything further relating to this application.

Please now work with participating NHS organisations to confirm capacity and capability, in line with the instructions provided in the "Information to support study set up" section towards the end of this letter.

How should I work with participating NHS/HSC organisations in Northern Ireland and Scotland?
HRA and HCRW Approval does not apply to NHS/HSC organisations within Northern Ireland and Scotland.

If you indicated in your IRAS form that you do have participating organisations in either of these devolved administrations, the final document set and the study wide governance report (including this letter) have been sent to the coordinating centre of each participating nation. The relevant national coordinating function/s will contact you as appropriate.



Please see IRAS Help for information on working with NHS/HSC organisations in Northern Ireland and Scotland.

How should I work with participating non-NHS organisations?
HRA and HCRW Approval does not apply to non-NHS organisations. You should work with your non-NHS organisations to obtain local agreement in accordance with their procedures.

What are my notification responsibilities during the study?

The standard conditions document "*After Ethical Review – guidance for sponsors and investigators*", issued with your REC favourable opinion, gives detailed guidance on reporting expectations for studies, including:

- Registration of research
- Notifying amendments
- Notifying the end of the study

The HRA website also provides guidance on these topics, and is updated in the light of changes in reporting expectations or procedures.

Who should I contact for further information?
Please do not hesitate to contact me for assistance with this application. My contact details are below.

Your IRAS project ID is **292346**. Please quote this on all correspondence.

Yours sincerely,
Gemma Warren

Approvals Specialist

Email: approvals@hra.nhs.uk

Copy to: *Professor Reza Razavi*

List of Documents

The final document set assessed and approved by HRA and HCRW Approval is listed below.

Document	*Version*	*Date*
Contract/Study Agreement template [Signed Software Evaluation Agreement-2017]	1	13 December 2017
Contract/Study Agreement template [Software Evaluation Agreement_April2021]	1	01 April 2021
Copies of materials calling attention of potential participants to the research [Social media message_V2_28.05.2021]	V2	28 May 2021
Copies of materials calling attention of potential participants to the research [Email Recruitment Circular V1_23.04.2021]	1	23 April 2021
Copies of materials calling attention of potential participants to the research [Flyer V1_23.04.2021]	1	23 April 2021
Evidence of Sponsor insurance or indemnity (non NHS Sponsors only) [Kings College London - CT VOI 2020 04.08.2020]		04 August 2020
GP/consultant information sheets or letters [GPletter_V1_23.04.2021]	1	23 April 2021
Interview schedules or topic guides for participants [PatientQualitativeInterview_V1_23.04.2021]	1	23 April 2021
IRAS Application Form [IRAS_Form_27042021]		27 April 2021
Letter from funder [BALeverhulme Small Research Grants SRG 2020 Round - Letter of Offer 02.06.2020]		02 June 2020
Letter from sponsor [Letter of Sponsorship 21.04.2021]		21 April 2021
Non-validated questionnaire [PatientQuestionnaire6_Weekly_V1_23.04.2021]	1	23 April 2021
Non-validated questionnaire [PatientQuestionnaire6_Weekly_V1_23.04.2021]	1	23 April 2021
Non-validated questionnaire [In session survey_V1_23.04.2021]	1	23 April 2021
Other [Responses to Committee's feedback]	V1	07 June 2021
Participant consent form [CF_Dissemination_V2_28.05.2021]	V2	28 May 2021
Participant consent form [ConsentForm_FocusGroup]	V1	04 June 2021
Participant consent form [ConsentForm_V1_23.04.2021]	1	23 April 2021
Participant information sheet (PIS) [InformationSheet_V2_28.05.2021]	V2	28 May 2021
Participant information sheet (PIS) [InformationSheetFocusGroup]	V1	04 June 2021
Referee's report or other scientific critique report [PPI Summary 2021 Qualitative Interview]	1	23 April 2021
Referee's report or other scientific critique report [PPI Summary 2021 SCED]	1	23 April 2021
Research protocol or project proposal [StudyProtocol_V1_23.04.2021]	1	23 April 2021
Summary CV for Chief Investigator (CI) [Cardi_CV_23.04.2021]		23 April 2021
Summary CV for student [AThompson_CV]	V1	03 June 2021
Summary CV for student [CCalissano_CV]	V1	03 June 2021
Summary CV for supervisor (student research) [TWard_CV]	V1	03 June 2021
Validated questionnaire [PatientQuestionnaire3_BAVQ_V1_23.04.2021]	1	23 April 2021
Validated questionnaire [PatientQuestionnaire4_SCSC_V1_23.04.2021]	1	23 April 2021
Validated questionnaire [PatientQuestionnaire5_DASS_V1_23.04.2021]	1	23 April 2021

Validated questionnaire [PatientQuestionnaire2_PSYRATS_V1_23.04.2021]	1	23 April 2021
Validated questionnaire [PatientQuestionnaire1_EDEQ_V1_23.04.2021]		