

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

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Abstract

Social rank theory states that achieving enhanced social rank is an essential biosocial goal for human beings, with individuals considering themselves to be high or low social rank on the basis of how they perceive that others view them. High social rank is associated with assertiveness, competence, and talent, whereas low social rank is associated with feelings of defeat and inferiority and submissive behavior. This theory has been applied to understand the etiology and psychopathology of eating disorders (EDs). The objective of this narrative systematic review was to summarize existing literature exploring perceptions of social rank and related constructs (e.g., submissiveness and inferiority) in EDs, to shed light on how individuals with EDs perceive their social rank, and to examine the relationship between perceived social rank and ED psychopathology. A systematic search of cross-sectional or longitudinal studies involving a clinical sample of individuals with EDs and using a validated measure of social rank or a related construct was conducted for studies published up to September 12, 2023 (PROSPERO, CRD42021227028). Five databases (Embase, Medline, PsycINFO, Web of Science, and PubMed) were systematically searched. Altogether, 1106 studies were included in the title and abstract screening. Seventeen studies (13 cross-sectional, 3 prospective cohort studies, and 1 ecological momentary assessment study) were included in the analysis and data extraction. The methodological quality of the studies was rated as generally good. There was evidence that individuals with EDs perceive their social rank as lower compared with healthy controls ($N = 5$ studies) and present features indicative of perceptions of low social rank ($N = 9$ studies). The perception of being of low social rank was significantly associated with more severe ED psychopathology ($N = 10$ studies). The findings of the review are discussed alongside limitations, implications for treatment models, and directions for future research.

KEYWORDS

assertiveness, eating disorders, inferiority, social comparison, social rank, submissiveness

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1 | INTRODUCTION

Social rank theory is an evolutionary theory grounded in the idea that 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). It has evolved to regulate behavior and social interactions and to ensure the 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). In this era of human evolution, social attractiveness, rather than dominance by aggression, is the preferred strategy for humans to achieve high social rank; this is accomplished by displaying attractiveness, talent, and competence (Gilbert, 1992, 1997; Troop et al., 2014). 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 et al., 2014). 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 other people view them and not on more objective characteristics or outcomes (e.g., socioeconomic status and professional status) (Gilbert et al., 1995; Price et al., 1994). The perception of being either high or low social rank has associated behaviors (e.g., dominance vs. submissiveness) as well as emotional correlates (Duarte et al., 2016; Gilbert et al., 2004; Troop et al., 2014). High social rank is characterized by feelings of competence and talent (Fournier et al., 2002; Gilbert, 1992; Troop et al., 2014). Low social rank is defined as the range of interconnected feelings, behaviors, and perceptions that arise from (i) the perception that one is of lower status than others; (ii) the feeling of having been put down by a dominant other; (iii) the feeling that one is unable to escape a situation; and (iv) the action of giving up to competing with others (Allan & Gilbert, 1995, 1997). These feelings and behaviors include a submissive and nonassertive interpersonal style, fear of rejection, feelings of inferiority, and shame (Allan & Gilbert, 1995, 1997).

Social rank theory has been applied to understand mental health conditions, primarily depression, where it has been suggested that symptoms of depression such as low mood and submissive behavior are an adaptive strategy employed by individuals to signal to dominant others that one does not wish to compete (Gilbert, 2006). More recently, the application of social rank has been extended to other forms of psychopathology such as social anxiety (Gilbert, 2000), auditory hallucinations in schizophrenia (Iqbal et al., 2000) and eating disorders (EDs) (Cardi et al., 2014; Troop et al., 2003, 2014).

EDs are psychiatric conditions that are primarily characterized by severe and persistent difficulties in eating behaviors and distressing emotions and cognitions related to food, weight, and physical appearance (American Psychiatric Association, 2013). The etiology comprises a complex interaction of factors, including heritability and biological factors, neuropsychological, socioemotional, and socio-cultural factors (Solmi et al., 2021; Szmukler et al., 1995; Treasure & Schmidt, 2013).

Individuals with ED commonly present with cognitive, affective, and interpersonal features that are indicative of perceptions of low social rank, such as high levels of unfavorable social comparison, feelings of inferiority and defeat, and submissive behavior (Allan & Gilbert, 1995, 1997; Ambwani et al., 2016; Cardi et al., 2014; Duarte et al., 2016; Troop et al., 2003, 2014). Social ranking on the basis of physical appearance can be particularly relevant to understanding the etiology and psychopathology of anorexia nervosa (AN) and bulimia nervosa (BN), where individuals focus excessively on social rank and how they stand in relation to others based on body characteristics (Duarte et al., 2016; Matos et al., 2015; Troop et al., 2003). Individuals with these disorders might attempt to gain higher rank by altering their physical appearance and body shape and engaging in restrictive or compensatory behaviors (Pinto-Gouveia et al., 2014; Troop et al., 2003, 2014). However, social rank theory is also relevant for EDs which are not characterized by appearance-based concerns (i.e., binge eating disorder, BED), supporting the view of attractiveness in much broader terms such as "social attention holding power" (Troop et al., 2003). Social attention holding power is the measure of one's ability to secure attention and elicit investment from other people. This is in line with the application of social rank to other disorders like depression which are not characterized by appearance-based concerns (Gilbert, 2006). In this case, ED symptoms might be an attempted adaptive response on the part of the individual to overcome states of negative self-evaluation and its associated effect, such as feelings of inferiority, social defeat, and shame, with restrictive or binge eating behaviors offering momentary relief from such feelings (Duarte et al., 2016; Rieger et al., 2010; Schmidt & Treasure, 2006; Troop et al., 2003, 2014).

Issues related to social rank perceptions could be both risk and maintenance factors for EDs. Understanding social rank theory in EDs can be considered key to identifying more vulnerable groups and informing prevention strategies as well as clinical interventions for those who suffer from these disorders (Cardi et al., 2014; Troop et al., 2003, 2014). Individuals who have recovered from the disorder present some of these features, suggesting that perception of low social rank might be a trait vulnerability factor for EDs, whereby individuals who perceive themselves to be of lower social rank are more likely to develop an ED (Cardi et al., 2014; Connan et al., 2007). Once developed, ED symptoms can reinforce and maintain these social difficulties (Caglar-Nazali et al., 2013; Fairburn et al., 2003; Treasure et al., 2012). However, given the complex etiology of EDs, it is also possible that difficulties related to social rank are a consequence of the disorders, which impact the individual's life in a pervasive way, affecting emotional, cognitive, and social functioning (Caglar-Nazali et al., 2013; Fairburn et al., 2003).

To the best of our knowledge, there is no previous systematic review specifically exploring the available evidence on social rank perceptions and EDs. Previous reviews and meta-analyses have focused on social comparison (Myers & Crowther, 2009) or interpersonal functioning (Arcelus et al., 2013) in EDs, but there is a lack of a specific review around social rank perceptions in EDs. According to the literature, social rank theory can provide an

important insight to understand some of the factors that play a role in the development and maintenance of EDs. A review is needed to provide an accessible and comprehensive overview of the available findings on this topic, which can inform future research and clinical practice. Therefore, the objective of this narrative systematic review was to identify, evaluate, and synthesize the existing literature on social rank and related constructs in EDs and to examine how individuals with EDs perceive their social rank compared with others and the relationship between social rank perceptions and ED psychopathology. The key constructs that emerged from social rank theory (i.e., social comparison, inferiority, and submissiveness) were included in the search strategy. Three hypotheses were postulated: (i) individuals with EDs will perceive their social rank as lower (compared with healthy controls [HCs]—if included in the study); (ii) they will present high(er) levels of unfavorable social comparison, inferiority, and submissiveness (compared with HCs—if included in the study); and (iii) perceptions of low social rank will show a significant positive association with ED psychopathology.

2 | METHOD

2.1 | Information sources and search strategy

The current review was registered on PROSPERO (ID: CRD42021227028). A systematic search guided by the recommendations from the Preferred Reporting Items for Systematic Reviews and Meta-analysis (PRISMA) Statement (Moher et al., 2010) was conducted. The PRISMA 2020 checklist is available in the Supporting Information: Table 4. Search strategies were developed for five electronic databases: Embase (1974–12 September 2023), Medline (1946–12 September 2023) and PsycINFO (1806–12 September 2023), Web of Science (1900–12 September 2023), and PubMed (1996–12 September 2023). The search was conducted for all studies published up to the search date. The search terms used were: 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. A definition and explanation of the relation between the search term used and social rank is provided in Supporting Information: Table 3. The specific search strategy for each database is also provided in the supplementary material. Inclusion criteria included: participants with a diagnosis of AN, BN, eating disorder not otherwise specified (EDNOS), other specified feeding or eating disorder (OSFED), BED, feeding disorder, avoidant restrictive food intake disorder (ARFID), only with the diagnosis made by a clinician based on DSM-5, DSM-IV, or ICD-10 criteria; studies using a validated measure to assess social rank or a related construct; and cross-sectional, longitudinal, or treatment studies published in peer-reviewed journals with full texts in English language. Reviews, commentaries, and dissertations were excluded. Studies were excluded if they did not include a clinical sample of participants with a clinician-made

diagnosis of EDs and if they did not employ a validated measure of social rank or related constructs. Solely qualitative studies were excluded. Two independent researchers (C. C. and A. T.) conducted the screening process. Endnote, Version 9.3.3 was used to manage the data. Duplicates were removed, and the titles and abstracts of the articles identified in the search were screened, with clearly irrelevant articles being removed. Following the initial screening, the full texts of the articles were reviewed against the inclusion and exclusion criteria, with articles classified as “included” or “excluded.” When screening by abstract and title, each record was screened once by one researcher, whereas both researchers screened all the full texts. Any disagreement was resolved through discussion with the wider research team (V. C. and T. W.).

2.2 | Data extraction

Data extraction was performed by one researcher (C. C.) using the following criteria: author, publication year, study design, sample size, primary diagnosis, mean age, age range, gender rates, measures of socioeconomic status (e.g., highest education achieved), race or ethnicity, length of illness, body mass index (BMI), standardized measure used to assess ED psychopathology, standardized measure to assess social rank or a related construct, key research questions, and key findings in relation to social rank and ED. These data will be extracted from all the studies where it is provided. Missing data were reported as “not reported” (i.e., NR). A quality check for data extraction was conducted by a second researcher (A. T.) by randomly checking the data that had been extracted for two variables from each paper included in the review.

2.3 | Quality assessment

The quality of retrieved articles was assessed using the National Institutes of Health (NIH) Quality Assessment Tool for Observational Cohort and Cross-Sectional Studies (National Institutes of Health, 2014). This was carried out by two researchers (C. C. and A. T.) and cross-checked in consultation with T. W. and V. C. The quality of the studies was assessed against 14 criteria, 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). A rating of “poor,” “fair,” or “good” was given to each study depending on how many criteria they met. More details are reported in the supplementary materials.

3 | RESULTS

3.1 | Study selection

A flowchart of the selection process is shown in Figure 1. The systematic search identified a total of 2527 articles. After duplicates

were removed, 1221 unique records remained; the titles and abstracts were screened for eligibility, with 1164 being excluded as irrelevant. The full texts of 57 articles were then evaluated and a further 40 articles were excluded. One conference abstract was

included. The main reasons for exclusion were articles not including a clinical sample with ED ($N = 26$), = articles not measuring social rank with a standardized scale ($N = 6$), and meta-analysis or qualitative studies ($N = 8$). The reference list of studies excluded by full-text

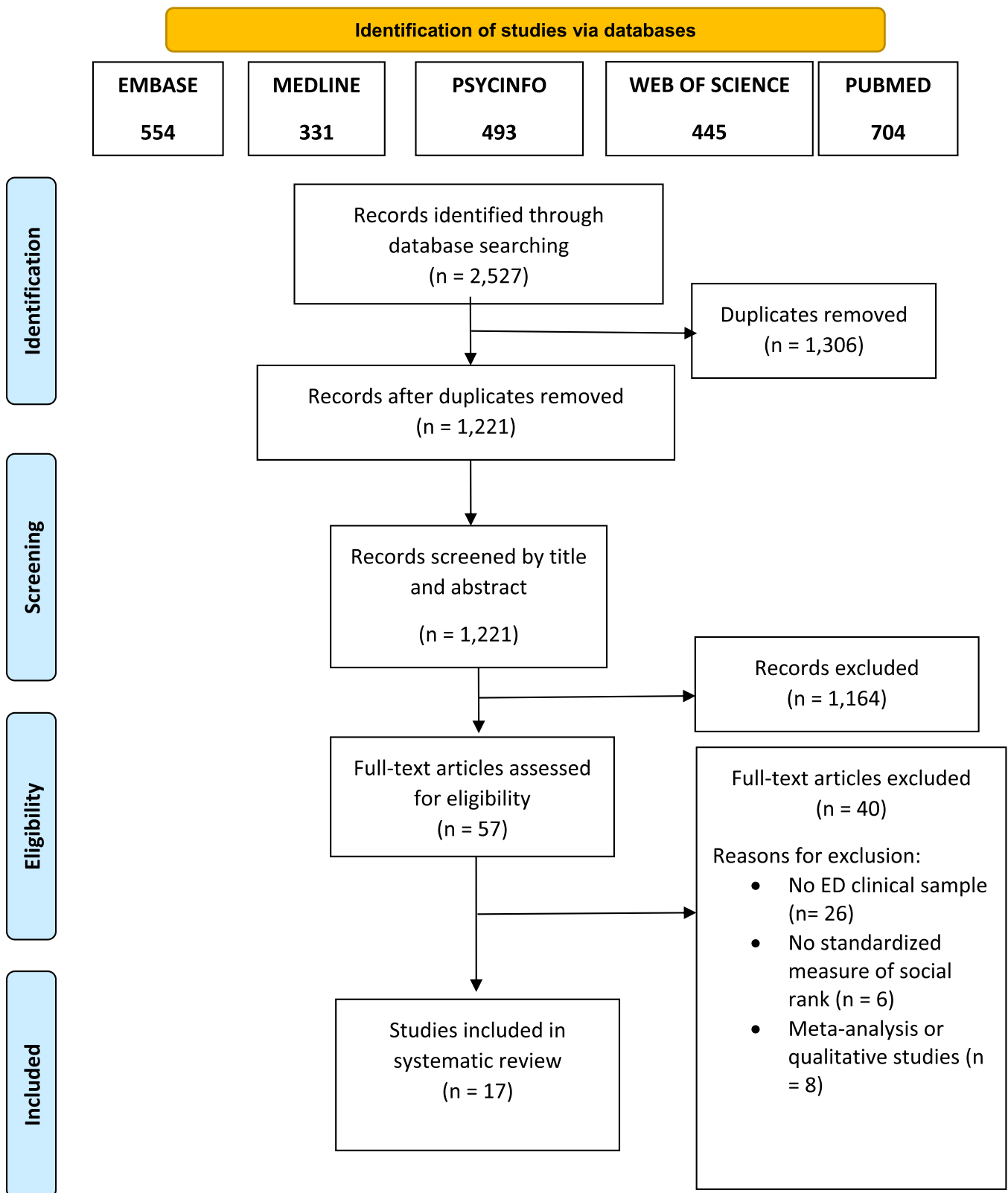


FIGURE 1 PRISMA flow diagram (Moher et al., 2010).

screening is provided in the supplementary material. Seventeen ($N = 17$) studies were included in the systematic review. The data extracted from the studies included is reported in Table 1 below.

3.2 | Study characteristics

The majority of the included studies employed a cross-sectional design ($N = 13$; 76.47%) (Ambwani et al., 2016; Blomquist et al., 2012; Brugnera, Coco, Salerno, et al., 2018; Brugnera, Coco, Tasca, et al., 2018; Cardi et al., 2014; Cardi et al., 2018; Connan et al., 2007; De Paoli et al., 2017; Duarte et al., 2016; Kalayci et al., 2019; Pinto-Gouveia et al., 2014; Troop et al., 2003, 2014). Three studies (17.64%) utilized a prospective cohort study design (Brugnera et al., 2019; Carter et al., 2012; Hartmann et al., 2010), whereas one study (6.25%) (Ma & Kelly, 2020) employed ecological momentary assessment (EMA), which assessed participants repeatedly in their natural environment in real time. For the prospective cohort studies, two did not report the length of time between baseline data collection and follow-up, but only described it as pre- and posttreatment (Carter et al., 2012; Hartmann et al., 2010), whereas in the other study (Brugnera et al., 2019), the length of time between baseline data collection and follow-up was 12 months. The majority of studies ($N = 12$; 70.58%) included a control group of healthy participants (i.e., not having a diagnosis of ED) (Ambwani et al., 2016; Brugnera, Coco, Salerno, et al., 2018; Brugnera, Coco, Tasca, et al., 2018; Brugnera et al., 2019; Cardi et al., 2014; Carter et al., 2012; Connan et al., 2007; De Paoli et al., 2017; Hartmann et al., 2010; Kalayci et al., 2019; Pinto-Gouveia et al., 2014; Troop et al., 2003).

A total of 4383 participants were included in the studies. Sample sizes ranged from 23 participants (Ma & Kelly, 2020) to 802 participants (Brugnera, Coco, Salerno, et al., 2018). Participants were aged 16–70 years and there was a strong trend toward participants being female, with eight studies (47.05%) reporting their sample as 100% female (Ambwani et al., 2016; Brugnera et al., 2019; Cardi et al., 2014; Connan et al., 2007; Duarte et al., 2016; Kalayci et al., 2019; Ma & Kelly, 2020; Pinto-Gouveia et al., 2014). Nine studies (52.94%) included male participants, although the proportion of males was low, ranging from 2% (Cardi et al., 2018) to 35% (Blomquist et al., 2012). In terms of clinical diagnosis, six studies (35.29%) included a sample of participants with AN only (Ambwani et al., 2016; Cardi et al., 2018; Carter et al., 2012; Connan et al., 2007; Kalayci et al., 2019; Ma & Kelly, 2020), and four studies (23.52%) included only participants with BED (Blomquist et al., 2012; Brugnera, Coco, Salerno, et al., 2018; Brugnera, Coco, Tasca, et al., 2018; Brugnera et al., 2019). The remaining studies involved more than one diagnosis, with five studies (29.41%) including participants with AN or BN (Cardi et al., 2014; Hartmann et al., 2010; Pinto-Gouveia et al., 2014; Troop et al., 2003) and two studies (11.76%) involving all three conditions (i.e., AN, BN, and BED) (De Paoli et al., 2017; Duarte et al., 2016). Only four studies (23.52%) reported the mean

duration of illness, which ranged from 7.1 (Carter et al., 2012) to 10.5 years (Cardi et al., 2014). The majority of studies ($N = 14$; 82.35%) reported the BMI for participants, which varied depending on the clinical group included (see Table 1).

3.3 | 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 ($N = 6$; 35.29%) (Cardi et al., 2014; Connan et al., 2007; De Paoli et al., 2017; Kalayci et al., 2019; Troop et al., 2003, 2014). The scale asks individuals to rank themselves compared with others on 11 bipolar constructs using a semantic differential approach, thereby ranking themselves from a more negative attribute (e.g., inferior, incompetent, unlikeable, left out, and unattractive) to a more positive attribute (e.g., superior, more competent, more likeable, accepted, and more attractive). A score around 60 indicates a person, on average, sees themselves as approximately equal to others. Higher scores indicate higher levels of favorable social comparison and higher perceived social rank.

Other standardized measures that assess related constructs of social rank were employed by the other studies. Six studies (35.29%) used the Inventory of Interpersonal Problems (IIP; Horowitz et al., 2000), a self-report measure of interpersonal problems and distress (Blomquist et al., 2012; Brugnera, Coco, Salerno, et al., 2018; Brugnera, Coco, Tasca, et al., 2018; Brugnera et al., 2019; Carter et al., 2012; Hartmann et al., 2010). This scale includes eight subscales, each composed of eight (long-version) or four items (short-version). The eight subscales are: domineering, vindictive, cold, socially inhibited, nonassertive, exploitable, overly nurturant, and intrusive. Higher scores indicate greater interpersonal problems in that domain. For the aim of the current review, only data relevant to the variable of submissiveness and assertiveness were extracted and analyzed.

In addition, some studies used the Submissive Behavior Scale (SBS; Allan & Gilbert, 1997), a self-report measure where participants rate how they act and feel about social situations ($N = 4$; 23.52%) (Cardi et al., 2014; Kalayci et al., 2019; Troop et al., 2003, 2014). It consists of 16 examples of submissive behavior (e.g., "I agree that I am wrong even though I know I'm not"), which people rate as a behavioral frequency (from 0 = *Never* to 4 = *Always*); higher scores indicate a higher level of submissive behavior. The Social Comparison Through Physical Appearance Scale was also used by two studies (11.76%) (SCPAS; Duarte et al., 2016; Ferreira et al., 2013; Pinto-Gouveia et al., 2014), a self-report measure that assesses the subjective perception of social ranking and group fit, according to the way one compares themselves with others, using physical appearance as a reference. Higher scores represent more favorable social comparisons.

TABLE 1 Characteristics, aims, and key findings of included studies.

Reference	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: M = NR (SD = NR) range = 18–65 SES: NR Race and ethnicity: NR	HCs = 36 Age: M = NR (SD = NR) Range = 18–65 SES: NR Race and ethnicity: NR	(1) To examine the difference between AN and HCs in relation to: (a) interpersonal self-efficacy (b) perceptions of dominance/dominance in other individuals (c) perceptions of coldness/warmth in other individuals (d) hypothetical behavioral 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 behavioral 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) Range = NR SES: NR Race and ethnicity: NR 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	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:

TABLE 1 (Continued)

Reference	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
Brugnera, Coco, Salerno, 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) Range = NR Higher-weight individuals (non-BED) = 44.5 (13.4) Range = NR SES: NR Race and ethnicity: NR BMI BED = 36.8 (8.2) Higher-weight individuals (non-BED) = 38.4 (6.5)	HCs = 108 (47% females) Age HCs = 37.3 (9.6) Range = NR SES: NR Race and ethnicity: NR BMI HCs = 23.8 (2.8)	development in terms of onsets of: (a) binge eating (b) dieting (c) onset of becoming overweight	Inventory of Interpersonal Problems-32 (IIP-32)	Binge Eating Scale (BES) Outcome Questionnaire-45 (OQ-45.2)	(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 (1) Compared with HCs and Higher-weight individuals participants, BED reported higher levels of interpersonal problems on all circumplex dimensions, except for Vindictive. BED had predominant friendly-friendly-submissive themes compared with friendly-dominant themes of higher-weight individuals and HCs. (2) Compared with the other two groups, BED reported significantly higher levels of psychological distress and binge eating severity.

(Continues)

TABLE 1 (Continued)

Reference	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
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 Higher-weight individuals = 50 Age BED = 44.42 (11.81) Range = NR Higher-weight individuals = 46.35 (12.13) Range = NR SES: BED: Completed university/college = 65.6% Family income = similar to Canadian average Higher weight individuals: Completed university/college = 71.4% Family income = above Canadian average Race and ethnicity: BED = 90% European descent Higher-weight individuals = 91.8% BMI BED = 38.15 (6.93) Higher-weight individuals = 37.36 (6.47)	HCs = 53 Age HCs = 43.39 (11.65) Range = NR SES: Completed university/college = 93.3% Family income = above Canadian average Race and ethnicity = 87% European descent BMI HCs = 23.20 (1.97)	(1) To investigate the severity and prototypicality of interpersonal problems in BED compared with higher-weight participants and HCs at baseline and posttherapy (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 with HCs, BED had significantly higher levels of interpersonal problems, with predominantly a nonassertive style at baseline (2) The intensity of nonassertive interpersonal problems of patients with BED decreased postgroup treatment, but their profiles remained prototypically nonassertive across all time points
Brugnera, Coco, Tasca et al. (2018)	Friendly and submissive interpersonal styles among patients with binge-eating disorder: A	BED	Cross-sectional	<i>Italian sample:</i> BED = 177 (11.3% males) Higher-weight individuals = 321 (28% males) <i>Canadian sample:</i>	Italian HCs = 108 (53% males) Canadian HCs = 49 (gender = NR) Age Italian = 37.3 (9.6)	(1) To compare interpersonal difficulties between BED, higher-weight individuals and HCs	Inventory of Interpersonal Problems (IIP)	None used	Compared with the higher-weight individuals and HCs, the BED group presented higher levels of interpersonal

TABLE 1 (Continued)

Reference	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	Key findings	
	cross-cultural comparison between Italian and Canadian patients.			<p>BED = 101 (gender = NR) Higher-weight individuals = 46 (gender = NR) Age: <i>Italian sample:</i> BED = 41.00 (13.40) Higher-weight individuals = 44.50 (13.4) Range = NR <i>Canadian sample:</i> BED = 44.42 (11.81) Higher-weight individuals = 46.35 (12.13) Range = NR SES: NR Race and ethnicity: NR Duration of illness = NR BMI = NR</p>	<p>Canadian = 43.39 (11.65) Range = NR SES: NR Race and ethnicity: NR</p>					distress and submissive interpersonal style.
Cardi et al. (2014)	Rank perception and self-evaluation in eating disorders	AN; BN	Cross-sectional	<p>N = 118 (100% females) AN-R = 29 AN-BP = 9 BN = 17 REC = 22 Age ED = 27.3 (10.2) Range = NR REC = 29.5 (8.4) Range = NR SES: ED: Years of education = 15.8 (3.4) REC:</p>	<p>HCS = 50 Age HCS = 25.3 (7.4) BMI HCS = 21.7 (1.9) Range = NR SES Years of education = 16.7 (3.0) Race and ethnicity: NR</p>	<p>(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 behavior (e) social comparison (2) To examine the link between social and self-related cues and ED symptoms</p>	<p>The Social Comparison Scale (SCS) The Submissive Behavior Scale (SBS) The Other as Shamer Scale (OAS)</p>	<p>Eating Disorder Examination Questionnaire (EDE-Q) Depression Anxiety Stress Scales (DASS) The Personal Feelings Questionnaire (PFQ-2)</p>	<p>(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 behavior (e) EDs behavior</p>	

(Continues)

TABLE 1 (Continued)

Reference	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
Cardi et al. (2018)	Social difficulties as risk and maintaining factors in anorexia nervosa: A mixed-method investigation	AN; atypical AN	Cross-sectional	Years of education = 16.4 (5.0) Race and ethnicity: NR Duration of illness ED = 10.5 (9.5) REC = 8.0 (6.2)BMI ED = 19.0 (4.0) REC = 21.8 (2.3) Total N = 90 (98% female) AN = 60 Atypical AN = 30 Age = 28.9 (11.1) Range = 18–63 SES: Years of education = 15.8 (3.0) Race and ethnicity: NR 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 submission (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)	showed unfavorable social comparison (2) In the ED groups, self-evaluation significantly predicted eating disorders symptoms (1) Involuntary submission and fear of negative evaluation correlated, and predicted eating disorder symptoms and these associations were partially mediated by perceived lack of social competence
Carter et al. (2012)	Interpersonal problems in anorexia nervosa: Social inhibition as defining and detrimental	AN	Prospective cohort	Total N = 618 (97% female) AN = 218 Age = 26.0 (7.6) Range = NR SES: NR Race and ethnicity: Caucasian = 87% Asian = 3% African Canadian = 2% Jewish or European = 8% Duration of illness = 7.1 years (6.8) BMI = 14.8 (1.8)	HCs = 400 Age = NR SES: NR Race and ethnicity: NR	(1) To examine interpersonal problems in AN compared with HCs (2) To determine whether interpersonal problems are related to AN psychopathology (3) To examine change in interpersonal problems following treatment	Inventory of Interpersonal Problems-32 (IIP-32)	Eating Disorder Examination Questionnaire (EDE-Q)	(1) Compared with HCs, AN reported higher level of submission and non-assertiveness (2) The above interpersonal problems had a significant positive association with eating disorder psychopathology at baseline

TABLE 1 (Continued)

Reference	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	Key findings
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) Range = NR REC = 27.4 (4.5) Range = NR SES: NR Race and ethnicity: NR	HCs = 16 Age = 27.5 (4.6) Range = NR SES: NR Race and ethnicity: NR	(1) To compare perceptions of 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 with HCs and REC, AN presented as lower social rank, with characteristics including a tendency to compare themselves unfavorably with others and an increased tendency to submissive behavior (3) Levels of submissiveness and non-assertiveness decreased following treatment
De Paoli et al. (2017)	Social rank and rejection sensitivity as mediators of the relationship between insecure attachment and disordered eating	AN; BN; BED; OSF-ED	Cross-sectional	Total N = 744 (98% females) AN-R = 56 AN-BP = 17 BN = 17 BED = 10 OSFED = 22 Age = 25.16 (7.60) Range = NR SES: Highest completed education: Primary = 1 (0.20) Secondary = 306 (49.20) Tertiary = 264 (42.30) Postgraduate = 51 (8.20) Race and ethnicity: Caucasian = 235 (37.80) Aboriginal = 1 (0.20) Asian = 259 (41.60)	HCs = 622 Age = 22.01 (8.63) Range = NR SES: Highest completed education: Primary = 1 (0.20) Secondary = 306 (49.20) Tertiary = 264 (42.30) Postgraduate = 51 (8.20) Race and ethnicity: Caucasian = 235 (37.80) Aboriginal = 1 (0.20) Asian = 259 (41.60)	(1) To compare interpersonal rejection sensitivity, appearance-based rejection sensitivity, and perception of social rank in ED and HCs (2) To examine a new interpersonal model for EDs in which interpersonal rejection sensitivity,	Rejection Sensitivity Questionnaire (RSQ) Appearance Based Rejection Sensitivity Scale (ABRSS) Social Comparison Rating Scale (SCRS)	The Eating Disorder Inventory 3 Revised (EDI-3) Experiences in Close Relationships scale (ECR-R)	(1) Compared with HCs, ED reported greater interpersonal rejection sensitivity, appearance-based rejection sensitivity and perception of low social rank (2) Interpersonal rejection sensitivity, appearance-based rejection sensitivity and

(Continues)

TABLE 1 (Continued)

Reference	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	Key findings
Duarte et al. (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	Race and ethnicity: Caucasian = 98 (80.30) Asian = 5 (4.10) European = 12 (9.80) Hispanic = 1 (0.80) Other = 6 (4.90) BMI = 20.98 (4.59)	European = 67 (10.80) Middle Eastern = 10 (1.60) African = 8 (1.30) Hispanic = 1 (0.20) Other = 41 (6.60) BMI = 22.35 (4.70)	appearance-based rejection sensitivity, and social rank mediate the relationship between insecure attachment and disordered eating	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)	social rank mediated the relationship between insecure attachment and disordered eating (1) Unfavorable social comparisons and high levels of self-criticism showed a significant positive association with the severity of eating psychopathology
Hartmann et al. (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) Range = 16-56 SES: NR Race and ethnicity: NR BMI AN-R = 14.6 (1.7)	German normative sample	(1) To explore the interpersonal patterns evident in patients with eating disorders compared with normal population (2) To examine differences in these patterns	Inventory of Interpersonal Problems (IIP-C)	Eating Disorder Inventory (EDI) Structured Inventory for Anorexic and Bulimic Syndromes (SIAB-S) Symptom Checklist-90 (SCL-90-R)	(1) Compared with HCs, the eating disorder sample reported moderate levels of distress in interpersonal functioning and a nonassertive and submissive

TABLE 1 (Continued)

Reference	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	Key findings
Kalayci et al. (2019)	Social functioning and its association with psychiatric symptoms in adolescents with anorexia nervosa	AN	Cross-sectional	Total N = 62 (100% female) AN = 32 Age = 15.35 (1.75) Range = 12–18 SES: Duration of education = 9.7 (1.8)	HCs = 30 Age = 15.35 (1.75) Range = 12–18 SES: Duration of education = 9.7 (1.8)	(1) To examine submissive behaviors, shyness, and social comparison in adolescents with AN compared with 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) Maudsley Obsessive-Compulsive Inventory (MOCI)	interpersonal style (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 (1) Compared with HCs, AN reported higher submissive behavior scores and shyness scores and lower social comparison scores (2) Submissive behaviors, 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.
Ma and Kelly (2020)	The fragility of perceived social rank following	AN	Ecological momentary	N = 23 (100% female) Age = 21.45 (2.99) Range = NR	No control group	(1) To examine changes in shame and pride scores:	State Shame and Guilt Scale (SSGS)		(1) In the hours before exercise, pride increased.

(Continues)

TABLE 1 (Continued)

Reference	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
	exercise in anorexia nervosa: An ecological momentary assessment study of shame and pride		assessment	SES: NR Race and ethnicity: Caucasian = 43.5% East Asian = 29.1% South Asian, Black, Arab = 27.4% BMI = 17.86 (1.08)		(a) Prephysical exercise (b) Postphysical exercise as times passed			but shame levels did not change significantly (2) Immediately after exercise, pride was higher, and shame lower as compared with later in the day. In the hours after exercise, pride decreased, and body/eating shame increased
Pinto-Gouveia et al. (2014)	Thinness in the pursuit for social safeness: An Integrative model of social rank mentality to explain eating psychopathology	AN; BN; ED-NOS	Cross-sectional	Total N = 225 (100% female) AN-R = 23 AN-BP = 10 BN = 31 EDNOS = 38 Age = 23.62 (7.42) Range = 13–44 SES: Years of education = 12.49 (3.01) Race and ethnicity: NR BMI	HCs = 123 Age = 23.54 (6.89) Range = 13–47 SES: Years of education = 12.63 (2.55) Race and ethnicity: NR 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) Perceptions of 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 behavior in eating disorder patients	AN; BN; ED-NOS	Cross-sectional	Total N = 202 (93% female) AN-R = 23 AN-BP = 15 BN = 51 EDNOS = 12 Age AN-R = 21.6 (4.6) AN-BP = 27.3 (9.1)	HCs = 101 Age = 26.7 (7.7) Range = NR SES: NR Race and ethnicity: NR	(1) To explore: (a) the perceived social comparison and submissive behavior in ED compared with HCs (b) the correlation between social	Social Comparison Rating Scale (SCRS) Submissive Behavior Scale (SBS)	Eating Disorders Inventory (EDI) Symptom Checklist (SCL-90-R)	(1) Compared with HCs, ED showed lower perceived social rank and higher submissive behavior (2) Social rank perception and submissive

TABLE 1 (Continued)

Reference	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
Troop et al. (2014)	Social rank and symptom change in eating disorders: a 6-month longitudinal study	AN; BN	Cross-sectional	BN = 28.5 (7.2) EDNOS = 26.6 (10.8) Range = NR SES: NR Race and ethnicity: NR BMI AN-R = 16.3 (3.9) AN-BP = 17.3 (1.9) BN = 24.6 (9.1) EDNOS = 22.8 (4.7) N = 73 (96% female) Age = 35.5 (9.9) Range = 19–57 SES: NR Race and ethnicity: NR 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 Behavior 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

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

3.4 | Measurement of ED psychopathology

Seven studies (41.17%) used the Eating Disorder Examination Questionnaire (EDE-Q; Fairburn & Beglin, 1994) to assess ED psychopathology (Brugnera et al., 2019; Cardi et al., 2014; Cardi et al., 2018; Carter et al., 2012; Connan et al., 2007; Duarte et al., 2016; Pinto-Gouveia et al., 2014). 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 et al., 1993); the Binge Eating Scale (BES; Gormally et al., 1982); the Eating Disorder Inventory (EDI; Garner et al., 1983); the Structured Inventory for Anorexic and Bulimic Syndromes (SIAB-S; Fichter et al., 1998); and the Short Evaluation of Eating Disorder (SEED; Bauer et al., 2005).

3.5 | Quality of studies

Overall quality ratings of the studies are displayed in Table 2. The quality of studies ranged from poor to good, with 2 studies (11.76%) being rated as methodologically *poor* (one of the studies was a conference abstract and most of the information was not available), 4 studies (23.52%) being rated as *fair*, and 11 studies (64.70%) being rated as *good*. Overall, most of the studies did not report if the participation rate of eligible participants was at least 50% and failed to provide a sample size justification. For all the studies, the criteria that related to exposures that can vary in amount or level were not applicable.

3.6 | Synthesis of findings

A summary of the findings in relation to the hypotheses is presented below. Table 2 provides a visual representation of whether the findings from each study supported the hypotheses.

3.6.1 | Hypothesis 1: Individuals with EDs will perceive themselves as lower social rank compared with HCs

Five studies directly examined the perception of social rank, as measured with the SCRS (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; Kalaycı et al., 2019; Troop et al., 2003). Cardi et al. (2014) compared scores on the self-reported measure of social rank between participants with AN, recovered ED participants (RECs), and HCs. The ED group reported significantly lower perception of social rank compared with the other groups. Consistent results were 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 with the HCs. Studies by De Paoli et al. (2017), Kalaycı et al. (2019), and Troop et al. (2003) provided further support to the findings that people with EDs, either AN or BN,

perceive themselves as low on the social hierarchy compared with HCs. Overall, findings supported the hypothesis postulated by the current review.

3.6.2 | Hypothesis 2: Individuals with EDs will present cognitive, affective, and interpersonal correlates of low social rank

Nine studies assessed the cognitive, affective, and interpersonal correlates of low social rank (e.g., submissiveness and inferiority) in samples of ED participants (Ambwani et al., 2016; Blomquist et al., 2012; Brugnera, Coco, Salerno, et al., 2018; Brugnera et al., 2019; Cardi et al., 2014; Carter et al., 2012; Connan et al., 2007; De Paoli et al., 2017; Hartmann et al., 2010). Overall, findings supported the second hypothesis postulated by the current review.

Submissiveness and non-assertiveness

Seven studies used the IIP (Horowitz et al., 1988, 2000) to assess interpersonal problems and interpersonal style in EDs and compared it with HCs (Ambwani et al., 2016; Blomquist et al., 2012; Brugnera, Coco, Salerno, et al., 2018; Brugnera, Coco, Tasca, et al., 2018; Brugnera et al., 2019; Carter et al., 2012; Hartmann et al., 2010). Overall, these studies suggested that individuals with EDs, regardless of the specific ED diagnosis, presented higher rates of friendly–submissive and nonassertive interpersonal profiles compared with HCs (Ambwani et al., 2016; Blomquist et al., 2012; Brugnera, Coco, Salerno, et al., 2018; Brugnera, Coco, Tasca, et al., 2018; Brugnera et al., 2019; Carter et al., 2012; Hartmann et al., 2010). Ambwani et al. (2016) experimentally assessed interpersonal perceptions and their anticipated social-behavioral sequelae among women with AN or OSFED and an HC group. Findings showed that participants with AN tended to perceive other people as more dominant than the HCs. They also selected cold-submissive responses more frequently than HCs. Carter et al. (2012) employed a prospective cohort design to assess changes in interpersonal style following treatment in a sample of participants with AN. Their results suggested that levels of submissiveness and non-assertiveness decreased following treatment. Similarly, Hartmann et al. (2010) showed that non-assertiveness decreased following treatment in a sample of participants with AN and BN.

Three studies specifically examined interpersonal style and difficulties in BED (Blomquist et al., 2012; Brugnera, Coco, Salerno, et al., 2018; Brugnera, Coco, Tasca, et al., 2018; Brugnera et al., 2019). Brugnera, Coco, Salerno, et al. (2018), Brugnera, Coco, Tasca, et al. (2018), Brugnera et al. (2019) compared a BED group with a group of higher-weight individuals and HCs and found that the BED group reported significantly higher nonassertive styles compared with the other two groups, suggesting that this is an interpersonal style characteristic of BED and not of higher-weight 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 nonassertive interpersonal problems of participants with BED

TABLE 2 visual representation of whether the findings from each study supported the hypotheses postulated by the current review and quality assessment ratings.

Reference	Hypothesis 1 - individuals with eating disorders will perceive themselves as lower social rank compared with healthy controls	Hypothesis 2 - individuals with eating disorders will present cognitive, affective, and interpersonal correlates of low social rank (e.g., unfavorable social comparison, inferiority, and submissiveness)	Hypothesis 3 - low social rank and related characteristics (e.g., inferiority and submissiveness) will show a positive correlation with eating disorder psychopathology	Quality assessment rating
Ambwani et al. (2016)	NA	✓	NA	FAIR
Blomquist et al. (2012)	NA	✓	✓	GOOD
Brugnera, Coco, Salerno, et al. (2018)	NA	✓	✓	POOR
Brugnera et al. (2019)	NA	✓	NA	GOOD
Brugnera, Coco, Tasca, et al. (2018)	NA	✓	NA	POOR ¹ This was a conference abstract therefore much of the information needed to conduct the quality assessment was not available.
Cardi et al. (2014)	✓	✓	✓	GOOD
Cardi et al. (2018)	NA	NA	✓	GOOD
Carter et al. (2012)	NA	✓	✓	GOOD
Connan et al. (2007)	✓	NA	NA	FAIR
De Paoli et al. (2017)	✓	✓	NA	FAIR
Duarte et al. (2016)	NA	NA	✓	GOOD
Hartmann et al. (2010)	NA	✓	NA	GOOD
Kalaycı et al. (2019)	✓	NA	×	GOOD
Ma and Kelly (2020)	NA	NA	✓	GOOD
Pinto-Gouveia et al. (2014)	NA	✓	✓	FAIR
Troop et al. (2003)	✓	NA	✓	GOOD
Troop et al. (2014)	NA	NA	✓	GOOD

decreased postgroup treatment, but their profiles remained prototypically nonassertive across all time points. Similarly, Blomquist et al. (2012) showed that individuals with BED tended to have a submissive interpersonal style and to show attempts to please others and win their approval through overly accommodating and nonassertive behaviors. Tendency toward submissive behavior was also reported in AN, whereby Connan et al. (2007) found higher levels of submissiveness in the AN sample compared with REC and HCs.

Cardi et al. (2014) reported findings that individuals with EDs showed a biased processing of social stimuli (i.e., heightened vigilance to social rank cues). This was measured with a behavioral 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 gray-scale pictures of the faces of different people (male and female) providing neutral and dominant poses and neutral and submissive poses. A fast reaction time (RT) was indicative that attention had been directed to the stimulus that obscured the probe. The 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.

De Paoli et al. (2017) examined attachment style and rejection sensitivity in relation to social rank in a sample of participants with AN, BN, and BED, compared with an HC group. Findings suggested that participants with an ED reported significantly higher levels of insecure attachment (both anxious and avoidant) as well as greater interpersonal rejection sensitivity and perceptions of low social rank compared with HCs. Additionally, they found that interpersonal rejection sensitivity, appearance-based rejection sensitivity, and social rank mediated the relationship between insecure attachment and disordered eating.

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 individuals with EDs reported higher levels of shame as well as unfavorable social comparison compared with HCs (Cardi et al., 2014). In the second study, Pinto-Gouveia et al. (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 a lower social rank position, shame, and the need to compete to avoid inferiority (i.e., insecure striving).

3.6.3 | Hypothesis 3: Low social rank and related characteristics (e.g., submissiveness and non-assertiveness) will show a positive correlation with ED psychopathology

The association between perception of social rank and related constructs (i.e., submissiveness, non-assertiveness, shame, and inferiority) and ED symptomatology was examined in 11 studies

included in the current review (Blomquist et al., 2012; Brugnera, Coco, Tasca, et al., 2018; Cardi et al., 2014, 2018; Carter et al., 2012; Duarte et al., 2016; Kalaycı et al., 2019; Ma & Kelly, 2020; Pinto-Gouveia et al., 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 symptoms of AN and BN. Results showed that low perceived social rank predicted an increase in AN but not BN symptoms over 6 months; however, higher perceived social rank at follow-up compared with baseline was not associated with a decrease in AN symptoms.

Cardi et al. (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 ED symptoms; similarly, in the second study, it was found that submissiveness and fear of negative evaluation predicted ED symptoms.

Carter et al. (2012) found that higher submissiveness and non-assertiveness showed a significant positive correlation with ED psychopathology in a sample of participants with AN. Troop et al. (2003) showed an association between perceptions of low social rank and high submissive behavior with ED symptoms, even after controlling for other psychiatric symptoms (i.e., depression). In line with this, Duarte et al. (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 perceptions of social rank in relation to BED symptoms (Blomquist et al., 2012; Brugnera, Coco, Salerno, 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, Coco, Salerno, et al. (2018) provided further support for an association between a friendly-submissive interpersonal style and binge eating severity.

Ma and Kelly (2020) adopted an EMA design. Based on the rationale that weight-control behaviors 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.

Lastly, Pinto-Gouveia et al. (2014) showed that perceptions of low social rank, as well as inferiority feelings and insecure strivings, correlated significantly with concerns about eating, body image dissatisfaction, and a drive for thinness in a sample of participants with AN or BN.

The only study which reported results that are in contrast with the ones reported above is Kalaycı et al. (2019), who found that social comparison and submissive behavior 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 synthesize the existing literature exploring the relationship between perceived social rank and EDs. Seventeen studies were included and examined to answer the research questions.

Overall, 12 of the 17 studies 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 EDs perceive their social rank as lower compared with HCs (Cardi et al., 2014; Connan et al., 2007; De Paoli et al., 2017; Kalaycı 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 other people perceive them (Allan & Gilbert, 1995, 1997). According to current findings, there is consistent evidence that individuals with ED systematically perceive themselves as being of lower social rank compared with others. 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, Coco, Salerno, et al., 2018; Brugnera et al., 2019; Carter et al., 2012; Hartmann et al., 2010). This would be consistent with the different forms of EDs having many common features and individuals often moving between the various diagnostic categories or meeting criteria for EDNOS. However, this is based on a limited number of studies and it is possible that different aspects of social rank perceptions play a different role in the different forms of EDs. In fact, the reviewed literature highlighted evidence to suggest that many psychological processes and constructs seem to be related to social rank, such as self-esteem, attachment style, shame, and insecurity striving (Ambwani et al., 2016; Blomquist et al., 2012; Brugnera, Coco, Salerno, et al., 2018; Brugnera, Coco, Tasca, et al., 2018; Brugnera et al., 2019; Carter et al., 2012; Connan et al., 2007; De Paoli et al., 2017; Hartmann et al., 2010). Findings also supported the second 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, Coco, Salerno, et al., 2018; Brugnera, Coco, Tasca, et al., 2018; Brugnera et al., 2019; Cardi et al., 2014; Carter et al., 2012; Connan et al., 2007; De Paoli et al., 2017; Hartmann et al., 2010). It was consistently found that ED participants presented submissive and non-assertive interpersonal profiles and tended to be non-assertive, accommodating, and exploitable in their interactions with others. This is potentially related to their perceptions of being low social rank, with individuals experiencing high levels of interpersonal distress and fearing rejection from others, wanting to avoid conflict, competition, and rivalry in attempts to avoid unfavorable social comparison, and feelings of inferiority and shame (De Paoli et al., 2017; Pinto-Gouveia et al., 2014). Individuals tend to be compliant with other people's requests to avoid rejection and criticism by others (Connan

et al., 2007). Additionally, one study suggested that individuals with EDs seem to have an attentional bias to social-rank cues, with a tendency to perceive social stimuli according to power relationships (Cardi et al., 2014). In fact, it has been shown that they engage in more social comparison and self-evaluation compared with controls, which has been generally linked with body dissatisfaction and disordered eating (Menzel et al., 2010).

Studies that examined the association between perception of social rank and ED symptomatology (Blomquist et al., 2012; Brugnera, Coco, Salerno, et al., 2018; Brugnera, Coco, Tasca, et al., 2018; Cardi et al., 2014, 2018; Carter et al., 2012; Duarte et al., 2016; Kalaycı et al., 2019; Ma & Kelly, 2020; Pinto-Gouveia et al., 2014; Troop et al., 2003, 2014) supported the third hypothesis by showing that perceptions of low social rank significantly correlated with ED symptoms. Regardless of the ED diagnosis, individuals who perceived themselves as being of low social rank or experiencing high levels of submissiveness, non-assertiveness, and inferiority feelings presented with more severe psychopathology. 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). Especially in AN, individuals are highly concerned with their weight and shape and engage in severe eating restriction or compensatory behaviors as a possible mechanism to gain or maintain high social rank (Pinto-Gouveia et al., 2014; Troop et al., 2003, 2014). Additionally, 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 and inferiority) and generate a sense of achievement and short-lasting positive emotions (Duarte et al., 2016; Schmidt & Treasure, 2006). This would support the view that social rank difficulties are relevant to EDs which are not primarily characterized by appearance-based concerns. 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 et al., 2012). Individuals with ED perceive interactions with others as distressing and struggle to be assertive and meet their needs through adaptive social interactions. In fact, they often experience interactions with others as invalidating (Cardi et al., 2014; Carter et al., 2012; De Paoli et al., 2017; Hartmann et al., 2010).

According to current findings, some of the low social rank features could be considered trait vulnerability factors for EDs (Cardi et al., 2014; Connan et al., 2007). Studies that included a group of recovered individuals showed that this group reported a lower perception of social rank compared with HCs as well as higher levels of submissiveness and non-assertiveness, and increased vigilance toward rank-related stimuli (Cardi et al., 2014; Connan et al., 2007). However, these are initial findings based on a limited number of studies, and the mechanistic role that social rank may have in the etiology 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 that make individuals more likely to develop an ED or whether

they are the unavoidable consequence of a disorder that impacts pervasively on the individual, from their social to emotional and cognitive functioning. Most of the studies included were cross-sectional, and there were only a few longitudinal studies that 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 and also showed that perceptions of 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). Troop et al. (2014) suggested that it could be possible to differentiate between two aspects of social rank: internally oriented (i.e., feeling low rank) and externally oriented (i.e., feeling that one is perceived by others to be low rank). According to this view, symptoms of AN might have the function of restoring or maintaining social rank in the minds of others (Troop et al., 2014). Further research in this area is needed to better clarify whether there are specific aspects of social rank that apply differently to various forms of EDs. As highlighted by the current review, there are many psychological processes that are related to rank and that should be taken into consideration to have a more comprehensive and rich understanding of the role that social rank perceptions play across the different forms of EDs. This goes beyond the scope of the current review, but future theoretical development should aim to integrate those better in a more comprehensive model.

The only study that reported results that were not in line with the one presented above is a study by Kalaycı et al. (2019) on adolescents with AN. Female adolescents with AN had higher level of submissive behaviors, a sense of inadequacy, and negative self-perceptions in their social relationships compared with HCs; however, social comparison and submissive behavior scores were not related to BMI, age of onset of the disease, and duration of the disease. It is important to note that the variance in age of onset and duration within this constrained younger sample is likely to be lower and that this is the only study which examined perceptions of social rank in a sample of adolescents. More work is needed to explore markers of severity within this age group and to shed light on the role of perceived social rank in the onset and maintenance of EDs.

Overall, this is the first review to identify, evaluate, and synthesize the existing literature on social rank and related constructs in EDs and to examine how individuals with EDs perceive their social rank compared with others and the relationship between social rank perceptions and ED psychopathology. A previous systematic review by Myers and Crowther (2009) examined social comparison in nonclinical samples, supporting the view that higher levels of social comparison result in more body dissatisfaction. Similarly, a systematic review on interpersonal functioning in EDs carried out by Arcelus et al. (2013) identified a strong relationship between low levels of assertiveness and EDs psychopathology as well as fear of negative evaluation in both AN and BN samples. These results could be considered in line with the results of the current study, which highlighted high levels of social comparison and negative evaluation

alongside low levels of assertiveness in individuals with EDs. The current systematic review adds to previous reviews by specifically focusing on social rank perceptions and related attributes (e.g., social comparison, inferiority, and submissiveness) in clinical samples and analyzing the relationship between social rank perceptions and ED psychopathology. However, it is important to note that the current review has some limitations. Most of the studies did not control for other variables when assessing perceptions of social rank in individuals with EDs. For instance, socioeconomic variables as well as aspects of diversity such as gender and sexuality were not taken into consideration. The relationship between such variables and social rank has not received much attention, but it could be argued that belonging to a marginalized or diverse group could detrimentally impact one's perception of social rank. Most of the studies did not also control for psychopathology, which makes it hard to determine whether the perception of low social rank could be accounted for by higher levels of psychopathology (e.g., anxiety and depression) in the ED group relative to the control group (Jewell et al., 2023). As reported above, the review included mainly cross-sectional studies, which limits the conclusions that can be drawn on the role of social rank in the development of EDs. Furthermore, it is important to consider that there is a limited number of published studies which examined social rank in EDs and which could be included in the current review. There is variation across these studies on the measure used to assess social rank and on the clinical sample employed. Therefore, the results should be considered in the context of these limitations, always taking into account the complex interaction of factors playing a role in the development and maintenance of EDs (Treasure & Schmidt, 2013).

4.1 | Clinical implications

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

First, 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 etiology, maintenance, and treatment of EDs, suggesting the importance of considering social rank and the related cognitive, affective, and interpersonal correlates in the assessment and treatment of EDs.

The current review has highlighted that perceptions of social rank are relevant to all the different types of EDs, even if the mechanisms by which they interact might differ across the various forms of EDs. The literature available is still limited and most of the studies are cross-sectional, with only a longitudinal study by Troop et al. (2014) not supporting clear improvements in eating pathology (Duarte et al., 2016). However, interpersonal treatments for ED aimed at reducing ED pathology by improving interpersonal functioning can be considered important. Indeed, all of the NICE-recommended therapies for EDs consider interpersonal functioning. The current findings indicate that a more targeted focus on social rank in the pathway to disordered eating behavior may be of value.

For example, approaches that increase self-compassion such as compassion-focused therapy (Goss & Allan, 2010; Gale et al., 2014) are incorporated into the Maudsley anorexia nervosa treatment for adults (MANTRA), a NICE-recommended treatment for anorexia nervosa (Schmidt et al., 2014). Such approaches can help target the shame and self-criticism associated with perceptions of low social rank. Interventions to help individuals challenge the negative automatic thoughts associated with perceptions of low social rank and to be more assertive in interpersonal relationship (Blomquist et al., 2012; Brugnera, Coco, Salerno, et al., 2018) and to find adaptive outlets to achieve status have been developed (De Paoli et al., 2017; Troop et al., 2014). Cognitive training approaches that focus on targeting the interpretation bias to social stimuli which underpins a vulnerability to low social ranking may be of value to augment treatment (Bryan et al., 2022; Cardi et al., 2019; Treasure et al., 2015, 2020). Interpersonal psychotherapy (IPT) has also been adopted and applied to EDs, especially BED (Jacobs et al., 2004; McIntosh et al., 2000; Rieger et al., 2010), suggesting a key role of negative social evaluation both as cause and consequence of ED symptoms. The less robust findings on the efficacy of IPT for BN and AN to some degree reflect methodological limitations in these studies but also reflect limited understanding of the interpersonal processes to target when implementing IPT in the ED context. The current review has shed light on how to refine the application of IPT for EDs and to address social rank issues trans-diagnostically (Rieger et al., 2010). Other novel relational and interpersonal frameworks using digital technologies, such as AVATAR therapy, which aim to improve individuals' ability to be assertive in interactions with others and toward challenging and gaining power over the disorder, may have potential (Cardi et al., 2022; Craig et al., 2018; Thompson et al., 2023). Indeed a case series to apply AVATAR therapy to patients with AN has recently been completed, which aims to establish feasibility and acceptability of this approach (Cardi et al., 2022).

5 | CONCLUSION

In summary, this review has shown that individuals with EDs perceive their social rank as lower than that of HCs and they manifest cognitive, affective, and interpersonal correlates of perceptions of low social rank. In fact, they often present with high levels of submissiveness, non-assertiveness, rejection sensitivity, and feelings of shame and inferiority. Perceptions of low social rank have a strong association with ED psychopathology, regardless of the ED diagnosis. This review has underlined the role of perceived social rank as a facet of the complex etiology of EDs and has considered the clinical implications that may inform treatment.

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CONFLICT OF INTEREST STATEMENT

The authors declare no conflict of interest.

DATA AVAILABILITY STATEMENT

Data sharing is not applicable to this article as no new data were created or analyzed in this study.

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SUPPORTING INFORMATION

Additional supporting information can be found online in the Supporting Information section at the end of this article.

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