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Eating Disorders and Sexual Function Reviewed: A Trans-diagnostic, Dimensional Perspective

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Abstract

Purpose of Review Clinical observation and a growing body of empirical research point to an association between disordered eating and sexual function difficulties. The present review identifies and connects the current knowledge on sexual dysfunction in the eating disorders, and provides a theoretical framework for conceptualizing the association between these important health conditions.

Recent Findings Research on sexuality and eating pathology has focused on clinical samples of women with anorexia nervosa (AN) and bulimia nervosa (BN). All aspects of sexual response can be impacted in women with an eating disorder, with sexual function in women with AN appearing to be more compromised than in women with BN. Research of this nature is extremely limited with respect to BED, non-clinical samples, men, and individuals with non-binary gender identities.

Summary Sexuality should be examined and addressed within the context of eating disorder treatment. Sexual dysfunction and eating disorders, along with commonly comorbid disorders of anxiety and mood, can be seen as separate but frequently overlapping manifestations of internalizing psychopathology. Psychological, developmental, sociocultural, etiological, and biophysical factors likely represent risk and maintenance factors for internalizing disorders. A dimensional, trans-diagnostic approach to disordered eating and sexuality has promising implications for future research and clinical interventions.

Keywords Sexuality · Eating disorders · Sexual function · Sexual dysfunction

Introduction

Although sexual function difficulties among individuals suffering from eating disorders have long been clinically observed, research examining this association is sparse. There is growing empirical evidence supporting the occurrence of considerable sexual and intimacy concerns among women with eating disorders. The extant literature has found women with an eating disorder to experience sexual problems across all areas of sexual response, including difficulties with sexual interest and desire, arousal, lubrication, orgasm, satisfaction, and pain [1–3, 4•]. Sexual dysfunction is associated with psychological concerns characteristic of women with an eating disorder, such as body dissatisfaction, as well as the physiological consequences associated with the main diagnostic categories. These psychological and physiological factors likely serve as risk and maintenance factors regarding the association between eating disorders and sexual dysfunction. The onset of puberty, menarche, and early sexual experiences have also been implicated as possible risk factors for the development of an eating disorder [3, 5]. Despite

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the established association between eating pathology and sexual dysfunction, sexuality is often not addressed in eating disorder treatment unless a history of sexual abuse is present. This paper reviews the existing research on sexual difficulties in relation to disordered eating and provides a conceptual biopsychosocial framework for the link between these two common health concerns.

Research has demonstrated marked difficulties in sexual function across samples of women with diagnoses of anorexia nervosa (AN), bulimia nervosa (BN), and binge-eating disorder (BED). The majority of research on disordered eating and sexuality focuses on the fifth iteration of the Diagnostic and Statistician Manual of Mental Disorders (DSM-5; [6]) diagnostic categories. AN is characterized as a refusal to maintain a minimally normal body weight, an intense fear of gaining weight, and a significant disturbance in the perception of the shape and size of one's body; it commonly manifests as two subtypes, including (1) AN restrictive type, marked by extreme dietary restraint and often excessive exercise, and (2) AN binge-purge type, characterized by binge-eating and compensatory behaviors in addition to caloric restriction [6, 7]. Few studies on sexual function have differentiated between AN subtypes. BN is characterized by the presence of binge eating, accompanied by the experience of loss of control over food intake, wherein an objectively large amount of food is consumed in a discrete period of time, followed by compensatory behaviors (e.g., vomiting, laxative abuse, excessive exercise, or fasting; 6). BED is defined by recurrent and persistent episodes of binge eating accompanied by feelings of loss of control, marked distress, and the absence of compensatory behaviors [6].

AN, BN, and BED have many shared features, and people struggling with an eating disorder often pass from meeting the symptom criteria from one diagnostic category to another over time [8]. Due to the instability and symptom overlap in diagnostic categories, there has been a recent conceptual shift away from the categorical classification system of the DSM-5 and toward a dimensional system more focused on the association between stable psychological features, symptom presentation, and body image disturbance [9]. We first review the existing literature (summarized in Table 1), followed by a discussion of sexuality, disordered eating, and associated comorbidities within a dimensional framework. Though much of the extant research on sexuality in the eating disorders focuses on bio-medical factors, a comprehensive biopsychosocial approach best explains the diagnostic overlap between eating disorders and sexual function conditions.

Methods

Broad search terms were used to identify all possible studies involving sexual function in the eating disorders. PubMed, PsychInfo databases, and Google Scholar were searched using a combination of eating disorder terms (set 1) with sexuality terms (set 2). The key words for set 1 included eating disorder, disordered eating, eating pathology, anorexia, anorexia nervosa, bulimia, bulimia nervosa, binge eating, binge-eating disorder, body image, and body dissatisfaction. Key words for set 2 included sexual function, sexual dysfunction, sexuality, sexual behavior, sexual anxiety, sexual desire, sexual arousal, sexual interest/arousal disorder, sexual pain, dyspareunia, provoked vestibulodynia, vaginismus, genito-pelvic pain/penetration disorder, orgasm, anorgasmia, sexual esteem, sexual activity, sexually transmitted infections, risky sexual behavior, sexual knowledge, and contraception. Articles were included based on the following criteria: (1) the study directly discussed sexuality in relation to eating pathology, (2) the article was relevant to clinical psychology, (3) the work was considered original. The suitability of articles identified was assessed through a review of the abstract, and where necessary, the text of the article. This paper focuses primarily on research published after 1996 (see Wiederman [40] for a review of earlier research).

Sexual Function and Eating Disorders

Anorexia Nervosa

Women with AN have reported pervasive sexual dysfunction, including decreased sexual desire, heightened sexual anxiety, sexual infrequency [3], difficulties with arousal, lubrication, orgasm, sexual satisfaction, and sexual pain [1, 2, 4•] compared to women without an eating disorder. Research examining sexuality in relation to AN subtypes is extremely limited. Women with AN of the restricting type tend to report greater sexual difficulties (e.g., lower fantasy and desire, more difficulties with orgasm, arousal, satisfaction, and pain) than those with AN of the binge-purge type [1, 35].

Diminished levels of reproductive hormones seen in women with AN contribute to sexual difficulties in this population [17••, 18]. Endocrinological dysfunction associated with amenorrhea[1] in AN may lead to difficulties with vaginal lubrication and vulvar pain with penetrative sex. Menstrual abnormalities have also been associated with reduced orgasm frequency [33]. The decrease in sexual drive found in women with AN is thought to reflect hypogonadism from emaciation as a result of extreme caloric restriction and malnutrition [17••, 38]. In support of this theory, loss of libido and sexual anxiety have been associated with lower lifetime BMI among women with an eating disorder, with women diagnosed with both AN subtypes reporting a higher prevalence of low desire than women with BN or eating disorder otherwise not specified (EDNOS; 3).

Weight loss has been linked to increased sexual dysfunction in women with AN, with more extreme weight loss associated with greater dysfunction and reduced sexual enjoyment

[1] Loss of menses for three or more consecutive months in post-menarche females

Table 1 Summary of relevant research on sexual function and eating disorders

Author (ref.)	Sample type and size	Study design	Country of research	Outcomes/main findings
Abraham [10]	BN ($n = 43$)	Longitudinal retrospective	Australia	- Experience withdrawal about sexual activity and lower sexual desire at higher BMI - All participants had been sexually active when symptoms present and absent
Beumont et al. [11]	AN ($n = 31$)	Interview	Australia	- Sexual challenges associated with AN - Low sexual interest with weight loss - Sexual activity fluctuates
Castellini et al. [12]	BED obese ($n = 107$); non-BED obese (Ob; $n = 110$); non-BED normal weight ($n = 92$)	Cross-sectional	Italy	- BED and obese reported lower sexual activity and intercourse frequency than controls - BED reported more SD than Ob, both BED and Ob reported more SD than controls - For BED, emotional eating, impulsivity, and shape concern predicted SD
Castellini et al. [1]	AN ($n = 44$); BN ($n = 44$)	Cross-sectional	Italy	- AN-R reported more SD than AN-BP and BN - Shape concern associated with SD in AN - Binge eating and emotional eating associated with SD in AN-BP and BN
Castellini et al. [13]	AN ($n = 37$); BN ($n = 41$)	Cross-sectional	Italy	- AN associated with more SD than controls - Higher reports of physical and sexual abuse
Castellini et al. [14]	AN ($n = 27$); BN ($n = 31$)	Longitudinal 1-year follow-up after CBT	Italy	- AN and BN showed improved SF with CBT - Women with history of childhood sexual abuse did not show improved SF with ED treatment
Castellini et al. [15••]	Various ED	Systematic review	NA	- Evaluated approach to research on sexuality and EDs; identified 4 categories of research: (1) role of puberty, (2) sexual abuse in the pathogenesis of EDs, (3) SDs in EDs, (4) sexual orientation as relating to ED psychopathology
Castellini et al. [16]	Non-clinical sample ($n = 60$); binge eating ($n = 33$); no binge eating ($n = 27$)	Cross-sectional and experimental	Italy	- Body esteem and binge eating associated with sexual distress and higher rates of dissociation during sexual activity - Women with higher levels of dissociation during sex and binge eating showed higher levels of cortisol in response to sexual stimuli
Castellini et al. [17••]	Various ED	Literature review	NA	- ED associated with SD, risky sexual behaviors, reports of infertility - metabolic alterations and psychopathology tied disordered eating influences SD in EDs
Copeland and Herzog [18]	AN ($n = 2$)	Case study	USA	- Diminished reproductive hormones led to sexual difficulties
Culbert and Klump [19]	Undergraduate students ($n = 500$)	Cross-sectional	USA	- Compensatory behaviors but not binge eating associated with sexual experience; impulsivity found to partially underlie this relationship
Dunkley et al. [20]	Undergraduate students ($n = 1175$)	Cross-sectional	Canada	- Drive for thinness, body dissatisfaction, and bulimic symptoms tied to cognitive distractions during sexual activity and poor sexual self-efficacy
Dunkley et al. [21]	Undergraduate students ($n = 789$)	Cross-sectional	Canada	- Body dissatisfaction and bulimic symptoms associated with poor SF - Psychological features characteristic of EDs partially mediate the association between ED risk and SD
Eddy et al. [22]	ED clinicians ($n = 234$)	Cross-sectional descriptive	USA	- ED clinicians described ED patients; AN tended to be childlike in sexuality, BN patients tended to be flirtatious and promiscuous - Constricted/overcontrolled personality associated with childlike sexuality independent of AN diagnosis - Undercontrolled/emotionally dysregulate personality predicted impulsive sexuality independent of BN diagnosis

Table 1 (continued)

Author (ref.)	Sample type and size	Study design	Country of research	Outcomes/main findings
Fichter et al. [23]	AN ($n = 103$)	Longitudinal 12-year descriptive	Germany	- Remission of AN symptoms associated with improvements in SF
Gonidakis et al. [24•]	AN ($n = 26$); BN ($n = 27$); students ($n = 58$)	Cross-sectional	Greece	- AN reported greater SD than controls; no significant differences in SF between BN and controls - SF in AN tied to low BMI - SF in BN tied to depression
Hicks et al. [25]	AN ($n = 28$); EDNOS ($n = 19$); BN ($n = 3$); controls ($n = 57$)	Cross-sectional	USA	- EDs less knowledge on sexual health risks, birth control, and preventing pregnancy
Irving et al. [26]	Undergraduate students with BN risk ($n = 117$)	Cross-sectional	USA, Midwest	- Higher risk of BN associated with early intercourse and more risky contraceptive behavior; weakly associated with greater comfort with sexuality; not associated with sexual attitudes
Jagstaidt et al. [27]	BN ($n = 32$); controls ($n = 28$)	Cross-sectional	Switzerland *article in Italian	- Body image dissatisfaction and depression strongly correlated with both ED and SD
Jagstaidt et al. [28]	BN ($n = 32$); control ($n = 35$); obese women with or without ED ($n = 62$)	Cross-sectional	Switzerland *article in Italian	- Obese women with ED reported greater SD, especially sexual avoidance and vaginismus, compared to obese women without ED
Kaltiala-Heino et al. [29]	Adolescent girls ($n = 19{,}196$); adolescent boys ($n = 19{,}321$)	Cross-sectional	Finland	- Bulimic behavior associated with early sexual experience and age of menarche - Onset of ejaculation at the normative age was protective for bulimic behavior
Kaltiala-Heino et al. [30]	Adolescent girls ($n = 4453$); adolescent boys ($n = 4334$)	Cross-sectional	Finland	- Bulimic behavior associated with sexual disinhibition in both males and females
Mangweth-Matzek et al. [5]	AN ($n = 50$); BN ($n = 50$); healthy controls ($n = 50$)	Cross-sectional interview	Austria	- ED associated with more negative ratings of menarche, pubertal body changes, and first sexual activities - BN more likely to have experienced sexual intercourse than AN
Mazzei et al. [2]	AN ($n = 23$); BN ($n = 14$)	Cross-sectional	Italy *article in Italian	- Higher rates of SD, lower sexual activity, and higher frequency of masturbation compared to controls
Morgan et al. [31]	ED ($n = 42$)	Cross-sectional treatment	USA	- Associated with higher rates of negative affect and decreased sexual interest compared to controls - AN associated with decreased frequency of masturbation compared to BN
Morgan et al. [32]	AN ($n = 11$)	Cross-sectional	UK	- Sexual drive restoration associated with weight restoration
Pinheiro et al. [3]	AN-R ($n = 84$); AN-P ($n = 67$); AN-B ($n = 25$); BN ($n = 23$); AN-BN ($n = 21$); EDNOS ($n = 22$)	Archival	Multi-region	- Low sexual desire and high sexual anxiety in EDs - AN-R and AN-P higher prevalence of low libido than BN and EDNOS - Low libido and sexual anxiety tied to lower lifetime BMI - SD in ED sample higher than normative data
Raboch and Faltus [33]	AN ($n = 30$); controls ($n = 50$)	Cross-sectional	Czechoslovakia	- AN psychosexual adaption in adulthood impaired - AN greater SD and weaker sexual arousal responses than controls
Rodriguez et al. [34]	BN ($n = 24$); controls ($n = 24$)	Cross-sectional	Spain	- BN rated erotic and food images as less pleasant and evoking a greater loss of control compared to controls
Rothschild et al. [35]	AN-R ($n = 18$); AN-B ($n = 11$); BN ($n = 13$)	Cross-sectional	USA	- ED associated with sexual dissatisfaction and body image disturbance
Ruuska et al. [36]	AN ($n = 28$); BN ($n = 19$)	Cross-sectional	Finland	- AN more negative sexual attitudes, fewer dating experiences, and less interest in dating than BN
Tiggemann and Williams [37]	Undergraduate students ($n = 116$)	Cross-sectional	Australia	- Appearance anxiety associated with SD

Table 1 (continued)

Author (ref.)	Sample type and size	Study design	Country of research	Outcomes/main findings
Tolosa-Sola et al. [4•]	ED ($n = 24$); controls ($n = 24$)	Cross-sectional	Spain	- Body dissatisfaction associated with lower SF and sexual satisfaction in ED and healthy controls - ED symptoms associated with greater SD and lower sexual satisfaction - ED group had higher rates of body dissatisfaction and sexual impairment than controls - Sexual satisfaction in ED group lower than controls independent of SD
Tuiten et al. [38]	AN	Cross-sectional	Netherlands	- AN associated with decreased sexual interest/drive, which was mediated by hypogonadism
Van der Ham et al. [39]	AN-R ($n = 23$); AN-BP ($n = 12$); BN ($n = 14$)	Longitudinal 4-year prospective follow-up	Netherlands	- Maturity fears and fear of becoming a sexual being in women with AN-R strongest predictor of poor ED outcome
Wiederman, [40]	Various EDs	Literature review	NA	- Personality characteristics, negative body image, early familial experiences, and a history of sexual trauma represent potential mediators of the association between disordered eating and SD
Wiederman and Pryor [41]	BN ($n = 221$)	Cross-sectional	USA	- Body dissatisfaction associated with later incidence and onset of masturbation
Wiederman et al. [42]	AN ($n = 131$); BN ($n = 319$)	Cross-sectional	USA	- BN more likely than AN to have had sexual intercourse, as well as report greater sexual interest and an earlier age of first coitus - Masturbation experience and sexual satisfaction inversely related to degree of caloric restriction, particularly in AN

ED eating disorder, *AN-R* AN restricting type, *AN-BP* AN binge-purge type, *SD* sexual dysfunction, *SF* sexual function, *CBT* cognitive behavioral therapy, *NA* not applicable, *EDNOS* eating disorder not otherwise specified

[10, 11, 43], while weight restoration often leads to improved sexual satisfaction [32, 42, 44] and increased libido [32]. Women with AN who endorsed aversion to sexual contact have also reported maintaining a low body weight [43]. These findings are consistent with research indicating that low BMI impairs the physiological function of sexual and reproductive organs [38]. However, conflicting findings exist, with other studies showing no association between BMI and sexual function (e.g., 16) or weight restoration and degree of improvement in sexual function [14]. The endocrinological dysfunction common to women with AN is less prevalent in women with BN, and women with BN seem to struggle less with sexual function than women with AN [3].

Bulimia Nervosa

Although research on sexual function in women with BN points to sexual difficulties (e.g., lower orgasmic function, arousal, lubrication, satisfaction, and more sexual pain than healthy controls; 1, 3), several studies have found sexual problems, such as diminished sexual desire and reduced orgasmic function, to be more severe in women with AN [3, 16, 42]. Women with BN are more likely to report being in a romantic relationship [1, 31], have higher levels of sexual esteem [31], and engage in partnered [5] and solo [31] sexual activity more frequently than women with AN. Adolescent outpatients with BN have reported being more interested in dating, more dating experiences, and less negative attitudes toward sexuality than adolescents with AN [36]. One study found women with AN to report significantly more sexual difficulties than healthy controls, with no statistically significant differences between women with AN compared to women with BN, nor women with BN compared to healthy controls [24•]. Another study found marked differences in sexuality among women with BN only in comparison to women with AN of the restricting subtype, and not the binge-purge subtype [1]. Similarly, this study found women with the restricting subtype of AN to report more significant difficulties across various domains of sexual function than the binge-purge AN subtype. The extent to which women with binge-purge tendencies experience sexual problems may depend on symptoms severity, with research on this population finding poor body image, higher BMI [10], and a greater frequency of binge-eating behaviors [1] to be associated with greater sexual dysfunction and avoidance.

There is some research indicating that women with BN are more likely to engage in risky sexual behaviors [17••]. Specifically, women with bulimic symptoms have been found to report an earlier age of sexual debut [26, 29] and sexual

disinhibition [30], while women with binge-eating symptoms have reported "disinhibited sexuality" [45]. Women with BN and AN of the binge/purging type were more likely to report having multiple partners than women with AN of the restricting type [1]. Given that women with BN are more prone to self-harm behaviors [45], risky sexual behaviors have been hypothesized to represent forms of self-harm among women with BN [17••]. Impulsivity and a tendency toward dissociative states have been suggested to be potential mediators of the association between BN symptoms and sexual risk-taking behaviors [16, 17••]. Indeed, impulsivity was found to fully mediate the association between compensatory behaviors (i.e., purging) and sexual experiences among a sample of undergraduates [19].

Whether sexual disinhibition represents a problematic sexual behavior in general is debatable; however, the potential consequences of these behaviors within eating disorder populations should be considered. Research has found people with eating disorders to be less aware of sexual health risks and the benefits of contraceptive use in guarding against sexually transmitted infections and unwanted pregnancies [25]. As risky sexual behaviors are associated with the likelihood of contracting sexually transmitted infections [46–48], a higher prevalence of STIs among women displaying BN symptoms might be expected. No research on STIs in eating disorders was found, suggesting this topic is a gap in the literature.

Binge-Eating Disorder and Obesity

Women with BED have endorsed disruptions to multiple areas of sexual function. Castellini and colleagues [12] evaluated sexual function in a clinical sample of obese women diagnosed with BED ($n = 107$) and compared them to a clinical sample of obese women without BED ($n = 110$) and with healthy weight controls ($n = 92$). The sexual function of obese women with BED was more impaired compared with obese subjects without BED and controls. Among women with BED, a greater frequency of objective binge-eating episodes was correlated with lower orgasmic ability, sexual satisfaction, and overall sexual function. Emotional eating (eating as a way to cope with negative emotions) was associated with sexual dysfunction among women with BED. Another study found obese women with an eating disorder to report greater sexual function difficulties, particularly vaginismus and sexual avoidance, than obese women without an eating disorder [28]. Sexual function difficulties among people with BED has been proposed to result from (1) being significantly overweight [49], (2) obesity-related gonadal dysfunction [50], (3) reduced vascular function in the genital tissues due to metabolic disruptions [51], (4) the psychological consequences of obesity [12, 15••], and (5) the metabolic abnormalities that arise from uncontrolled overeating. Of note, the latter is the only factor that separates BED from non-BED obese individuals; thus, it is possible that most of the effects of BED on sexual function are due to being overweight.

Longitudinal and Treatment Research

The majority of research on sexual function and eating disorders has been cross-sectional in design. Few studies have gathered longitudinal information on sexual difficulties in people with an eating disorder. One study that examined the long-term course of AN ($n = 103$) over 12 years found that women who had recovered from AN reported notable improvements in sexual problems, whereas women who continued to suffer from eating pathology did not [23]. Indeed, sexual problems, coupled with impulsivity, long duration of inpatient treatment, and long duration of an eating disorder, predicted 45% of the variance in outcome at the 12-year follow-up. A 4-year prospective follow-up study investigating the predictive value of psychological factors in the course of eating disorder patients ($n = 49$) found that maturity fears and fears of becoming a sexual being in women with restrictive type AN (but not of the binge/purge type or BN) to be highly correlated with poor outcome. Finally, a 1-year follow-up study found the sexual function of women with BN ($n = 31$) and women with AN ($n = 27$) to improve following standard individual Cognitive Behavioral Therapy for disordered eating; reductions in eating disorder severity were associated with improvements in sexual function without significant differences in diagnostic group [14]. However, women with a history of childhood sexual abuse did not show a significant improvement in sexual function following treatment, indicating that a history of childhood sexual abuse may moderate the relationship between eating disorder psychopathology and sexual function. Together, these studies suggest that sexual function tends to improve alongside reductions in eating pathology, but that psychosexual and etiological factors may influence this association.

Men and Sexual/Gender Minorities

With the exception of studies investigating the role of sexual orientation in eating disorders, research on sexuality and eating pathology in men is relatively non-existent. There is evidence to suggest that non-heterosexual men are at a greater risk of developing an eating disorder [52–57]; this is hypothesized to result from minority stress as well as cultural pressures concerning physical appearance among men of same-sex attraction [15••]. Given the lower prevalence of AN and BN in men, future research might investigate the association between sexuality and disordered eating in non-clinical and BED samples. There is similarly a dearth of literature on sexuality and disordered eating among individuals of non-binary gender identities. The limited research of this nature indicates that

individuals who identify as transgender or non-binary report a greater prevalence of eating disorders [58, 59]. Given the role of body image with respect to eating disorders and sexual function concerns, research on people of diverse gender identities would be a valuable contribution to the literature.

Non-clinical Samples

Research on sexuality and disordered eating has primarily focused on clinical samples of women with an eating disorder. However, the association between sexual function and disordered eating behaviors has also been observed in non-clinical samples of women without an eating disorder diagnosis. Among a sample of undergraduate females, binge-purge symptoms, body dissatisfaction, and drive for thinness were associated with more body- and performance-based cognitive disruptions during sexual activity, as well as lower sexual self-efficacy across multiple areas, including perceived competence in the behavioral, cognitive, and affective dimensions of female sexual response [20]. Undergraduate women who endorsed higher levels of binge-purge symptoms and body dissatisfaction also reported more sexual function difficulties, with disordered eating being associated with lower sexual arousal, satisfaction, and lubrication, and more sexual pain [21]. Dysfunctional body image and binge-eating tendencies were similarly associated with greater sexual distress among a community sample of women [16]. A plethora of research has also demonstrated the link between poor body esteem and negative sexual outcomes in non-clinical samples (see [60] for a review). These studies show that the association between eating pathology and sexual concerns exists even if those difficulties or concerns have not crossed a diagnostic threshold.

Eating Disorders and Sexual Dysfunction as Internalizing Psychopathology

The etiological factors involved in eating disorders may contribute to the manifestation of sexual difficulties, and psychological factors, such as depression, anxiety, poor body image, and certain personality characteristics, may underlie the connection between disordered eating and sexual concerns. There is a growing body of evidence suggesting that psychopathological features common to eating disorders and sexual function conditions represent risk factors for the development and maintenance of both eating pathology and sexual dysfunctions. The investigation of eating disorder phenotypes in relation to stable psychopathological traits represents a burgeoning area of study consistent with the Hierarchical Taxonomy of Psychopathology (HiTOP)—a new research-based classification system of mental disorders derived from the structural analysis of empirical research [61].

HiTOP constructs psychopathology based on covariation of symptoms, grouping related symptoms together while combining co-occurring syndromes on a dimensional "spectra," thereby addressing problems relating to diagnostic boundaries and instability, as well as issues of comorbidity and heterogeneity [61]. HiTOP categorizes sexual problems (low desire, difficulties with arousal, orgasmic function, and sexual pain; 62, 63), eating pathology (BN, AN, BED; 64, 65), fear-based disorders (social phobia, agoraphobia, specific phobia, social anxiety disorder, panic disorder, obsessive compulsive disorder), and distress-based disorders (major depressive disorder, dysthymia, generalized anxiety disorder, post-traumatic stress disorder, borderline personality disorder; 66–72) as subfactors under a class of internalizing disorders, which lead to symptom components and maladaptive traits, followed by the manifestation of symptoms and signs of psychopathology. The empirical literature on each of these conditions suggests significant overlap between the sub-spectra of internalizing disorders, with conditions of sexual function, disordered eating, anxiety, and mood representing common comorbid conditions with etiological similarities [6, 73].

Laurent and Simons [73] proposed a model for conditions of sexual function, mood, and anxiety as internalizing disorders that arise as a result of psychodynamic, cognitive behavioral, sociocultural, and physical/biological factors. These factors, which have been separately discussed in the eating disorder literature, are presented by the authors as vulnerabilities for an internalizing problem, with causal factors representing a "complex, multifactorial, multiple determinants" of the internalizing syndromes, that "do not favor one set of causes over another" (582, p. 66). Though there is HiTOP-based research directly examining the association between eating disorders, mood, and anxiety, and research directly examining the association between sexual dysfunction, mood, and anxiety, studies examining these varied aspects of internalizing spectra together are scant. The empirical literature supports a connection between eating disorders and sexual dysfunction, and research of this nature within the HiTOP classification system of internalizing disorders has the potential to inform more effective trans-diagnostic treatments for these related diagnoses. Trans-diagnostic treatments addresses psychopathological processes underlying and maintaining the shared clinical features produced by two or more diagnosable conditions; such treatments target the particular psychopathological features present and the processes that maintain them rather than a specific disorder. Future research may examine how eating disorders fit into Laurent and Simons' [73] model and the HiTOP framework more generally, wherein pathological eating and compensatory behaviors, sexual function difficulties, and disorders of negative affect can be viewed as secondary epiphenomena resulting from higher-order internalizing psychopathology, such as poor self-esteem and body image disturbance.

Body image issues represent a prominent psychopathological feature implicated in the occurrence of both sexual difficulties and eating disorders. Disturbance of body image represents a primary feature of all eating disorders [1, 4•, 12], and the most common age of onset for eating disorders is around puberty, which involves the development of secondary sex characteristics and corresponding changes in body image [74]. Sexual function difficulties are associated with body uneasiness in women with AN, and shape concerns in women with BN [16] and AN of the restricting type [1]. Women with BN who endorsed higher levels of worry about their body image also reported lower sexual desire [24•]. Poorer sexual function has also been associated with more shape concerns in women with BED [12]. Body dysmorphia—a mental health condition common to eating disorders and defined as an excessive preoccupation with perceived flaws in appearance that are minor or not observable to others [6]—has also been tied to greater sexual dysfunction and lower sexual satisfaction in women both with and without an eating disorder diagnosis [4•]. Research has demonstrated an association between poor body image and sexual difficulties in non-clinical samples of women, with body dissatisfaction, weight concerns, thoughts about the body during sex, and low perceived sexual attractiveness predicting more sexual difficulties [75]. Positive body esteem has been linked to more frequent sexual experiences [76], higher sexual esteem [77, 78], greater sexual desire [79], sexual pleasure, orgasmic frequency [80], and sexual satisfaction [81–83], as well as lower sexual anxiety, less sexual dysfunction [78, 84, 85], and fewer risky sexual behaviors [86] in women without an eating disorder. Body image has also been proposed as a mediator of the association between sexual function and disordered eating [15••].

Stice's [87] dual pathway model explains how sociocultural risk factors related to body image interact with psychological and behavioral factors in the development of eating disorder symptoms. Specifically, socioculturally prescribed ideals for body image and stereotype internalization lead to body image dissatisfaction, which leads to dietary restraint and depression, resulting in the development of an eating disorder. As shown in Fig. 1, sociocultural factors represent vulnerabilities for the development of internalizing problems [73]. Tolosa-Sola and colleagues [4•] examined the association between disordered eating and sexuality in women with an eating disorder and healthy controls using Stice's model [87]. The clinical group was first compared to healthy controls, and comparatively reported greater body dissatisfaction and sexual dysfunction. Among women in the clinical group, those who endorsed a greater drive for thinness showed more sexual function difficulties. The components of Stice's [87] model align with the role of sociocultural factors [88], depression [89], and body image [75] in the development and maintenance of sexual difficulties, and thus represents a promising approach to future research on disordered eating and sexuality.

The personality profiles of individuals struggling with internalizing psychopathology are also relevant, with negative affectivity and neuroticism being characteristic of disorders falling under this class [90]. Personality styles typical of women with eating disorders have been identified and are relevant to expanding knowledge on the association between impaired sexual function and eating disorders. A study examining the extent to which personality patterns account for meaningful variation among women with different eating disorder diagnoses found patterns of perfectionism, control, and emotional regulation to correlate with eating disorder symptom presentation [91]. Women who endorsed restrictive eating were more likely to present with a constricted/overcontrolled personality, while women who endorsed binge-purge behaviors were more likely to present with an emotionally dysregulated/undercontrolled personality. In terms of sexual implications, women with the same eating disorder diagnosis but different personality styles might exhibit corresponding differences in sexuality. Indeed, Castellini et al. [17••] suggested that the difference in the severity of sexual concerns due to pathological behaviors observed in research on AN versus BN, and AN of the restricting type compared to AN of the binge-purge type, may result from specific personality characteristics typical of symptom presentations.

Eddy et al. [22] examined associations between the aforementioned personality characteristics (i.e., perfectionism, control, and emotional regulation; 91) in relation to sexuality via the case-reports of experienced eating disorder clinicians, and found clear links between sexuality and personality among individuals with eating disorders. Specifically, eating disorder patients described as being high in perfectionism tended to display comparatively higher levels of healthy sexuality and lower levels of seductive and destructive sexuality. Those with constricted/overcontrolled personalities exhibited lower levels of healthy sexuality and tended to present themselves as being non-sexual, and childlike in appearance or mannerisms. These women were more likely to restrict their food intake, and displayed a congruently restrictive sexual style. Those with emotionally dysregulated/undercontrolled personalities reported higher rates of binging and purging behaviors and higher levels of seductive sexuality with a similarly destructive and impulsive sexual style. These personality traits were found to predict a significant proportion of the variance in sexual attitudes and behavior beyond that accounted for by eating disorder symptom presentation. Such findings suggest that personality variables common to those with eating pathology may account for additional variability in sexual function. These results are consistent with research conceptualizing sexual function in eating disorders as alterations in decreased sexuality or hypersexuality [5], whereby eating disorder patients presenting as overcontrolled and emotionally constricted (as is commonly observed in AN of the restricting type) experience diminished sexual function, and those presenting

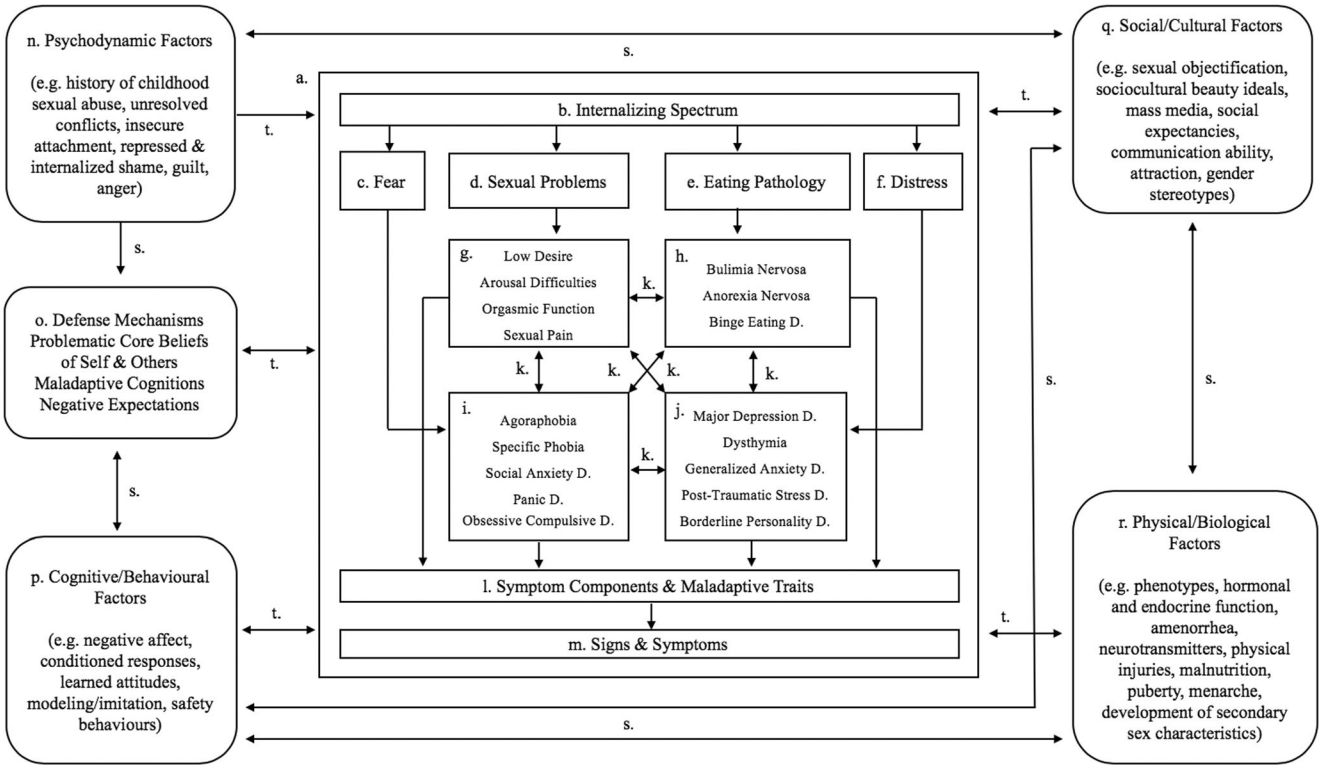

Fig. 1 An amalgamation of HiTOP's internalizing psychopathology and Laurent and Simons' (2009) model, adjusted to include eating pathology and associated risk/maintenance factors. Arrows indicate the theorized directions of causality and the interaction of factors. The center of this model (a) depicts the spectrum of internalizing conditions (b) according to the HiTOP framework, including sexual problems (d), fear- (c) and distress-based (f) concerns, and eating pathology (e). The various syndromes (g–j) that fall under each class of concern (c–f) represent the threshold at which a set of dimensional symptoms defining a disorder becomes sufficiently distressing or disabling (l and m). Grouping co-occurring disorders (c–f) under a single taxonomical approach (b), accounts for issues of heterogeneity, comorbidity, diagnostic instability, and boundary problems that occur within categorical rather than dimensional nosologies. These conditions (g–j) are thus conceptually linked to each other under the class of internalizing disorders (b), with each syndrome interacting with and influencing other syndromes (k). The exterior of the figure is draws on Laurent and Simons' (2009) model with the addition of factors implicated in eating pathology. These causal factors represent a potential vulnerability or diathesis (n–r) for the development of an internalizing problem (b). This model includes elements relating expansively to psychological, cognitive behavioral factors (p), psychodynamic (n) and etiological factors, social and cultural factors (q), as well as biological and physiological factors (r). Causal factors (n–r) are complex, multifactorial determinants of the four internalizing syndromes (c–f), and interact with one another (s), further influencing the association between each causal factor and each internalizing syndrome. With the exception of psychodynamic theories (n; which are developmentally derived), the associations between internalizing disorders (a) and causal factors (o–r) can be reciprocal (t), with internalizing disorders reinforcing causal factors and in turn strengthening the influence of causal factors on internalizing conditions. In sum, this figure illustrates how eating pathology (e), sexual dysfunction (d), anxiety (i), and depression (f) relate to one another under a larger internalizing dimension (b), and shows how numerous causal factors (n–r) might contribute to the development and maintenance of an internalizing disorder (a)

as emotionally dysregulated and impulsive (as is typical of BN and AN of the binge/purge type) experience more chaotic and uncontrolled sexual styles [91].

As noted above, etiological factors—in particular, a history of childhood sexual abuse—have been implicated in the relationship between disordered eating and sexual function [14]. Women with an eating disorder and women suffering from sexual function conditions are more likely to report a history of sexual abuse than women in the general population [13, 14, 92–94]. There is considerable research showing that sexual abuse represents a risk factor for the development and maintenance of an eating disorder, sexual dysfunctions, and poor body esteem [14, 93, 95, 96]. Both cross-sectional and longitudinal research has demonstrated an association between sexual abuse and eating disorder onset [97, 98], and childhood sexual abuse has been found to moderate the relationship between sexual function and eating disorder psychopathology following treatment [14]. Consistent with Laurent and Simons' model [73], childhood sexual abuse is theorized to influence child development across cognitive, behavioral, emotional, social, and physical domains, in turn heightening the risk for developing an eating disorder and associated psychopathology [99]. Eating disorder treatments for clients with a history of sexual abuse would likely benefit from the incorporation of material targeting the cognitive

and emotional consequences of sexual abuse, including material on body image perception and sexuality [14, 100].

Figure 1 depicts an amalgamation of HiTOP's internalizing spectrum and Laurent and Simons' model [73], with the incorporation of eating disorder conditions and associated risk factors, based on the literature reviewed here. At the center of this model, sexual dysfunctions, anxiety (fear-based), depression (distress-based), and eating disorders are conceptually linked to each other under the class of internalizing disorders; each disorder interacts with and is mutually influenced by other disorders, and offers one explanation for the known high rates of comorbidity between these conditions [6]. The exterior of the model illustrates the numerous multifaceted factors that represent potential vulnerabilities to an internalizing problem [73]. With the exception of psychodynamic theories (which are developmentally derived), the associations between internalizing disorders and causal factors can be reciprocal, with internalizing disorders reinforcing causal factors and in turn strengthening the influence of causal factors on internalizing conditions. As noted by Laurent and Simons (583, p. 66), this model is "not meant to be exhaustive or complete" and instead displays "how multiple determinants might cause or maintain an internalizing disorder," as well as how sexual dysfunctions (and in the present model, eating disorders) "relates to depression and anxiety in a way that places each syndrome as part of a larger internalizing dimension." Future research may examine how eating disorders fit into Laurent and Simons' model [73] and the HiTOP framework.

Conclusions

The extant literature points to a considerable link between sexual difficulties and disordered eating. Evidence for the association between sexuality and disordered eating comes from etiological, psychological, physiological, and sociocultural perspectives. Though the majority of the research on sexuality and disordered eating focuses on clinical samples, there is evidence supporting an association between sexual problems and disordered eating among women without a clinical diagnosis of an eating disorder (e.g., 21). Future research investigating the association between eating pathology and sexual function is thus relevant to women in the wider population, in addition to being clinically meaningful. Regarding clinical implications, sexuality is typically only addressed in eating disorder care when a history of sexual abuse is present. This review shows that sexual function should be considered within the context of eating disorder treatment. Examining sexuality in clients with an eating disorder has the potential to inform prognosis, case conceptualization, and treatment planning. Cognitive-behavioral and mindfulness-based treatments for disordered eating could include material on sexual function, with treatment research having demonstrated the beneficial impact of these evidence-based treatments on sexual difficulties (e.g., 101). Experimental research investigating the efficacy of psychological interventions tailored to address both sexual difficulties and eating pathology should be pursued, perhaps from the dimensional approach of treating internalizing disorders and associated risk factors (Fig. 1).

Longitudinal research is needed to better understand on the association between eating pathology and sexuality over the course of eating disorder treatment. Such research might examine sexual function in relation to weight restoration and endocrine alterations, as well as changes in psychopathology and behavioral symptoms following psychological treatments. The few studies of this nature indicate that sexual difficulties tend to diminish with the remission of eating disorder symptoms following treatment, but that certain etiological and psychological factors may influence this pattern (e.g., 14). Future longitudinal work might test for causality in the association between sexual dysfunction and disordered eating, particularly in relation to psychological and physiological factors (Fig. 1), and response to treatment.

Psychological, physiological, etiological, and sociocultural factors contribute to sexual difficulties in women with an eating disorder. Eating pathology and sexual dysfunction can be conceptualized as manifestations of internalizing psychopathology under the HiTOP framework (Fig. 1), along with anxiety and mood disturbances, which frequently co-occur in women with sexual function conditions and with eating disorders [6]. Body image insecurities, stable psychological traits (e.g., emotional liability, impulsivity, neuroticism), and etiological factors (e.g., a history of sexual abuse) represent potential mechanisms underlying the association between eating disorders and sexual function difficulties. Research on sexuality and disordered eating focusing on eating disorder psychopathology and symptoms rather than specific diagnostic categories is needed. Cross-sectional research on sexual function and disordered eating would benefit from greater sample sizes, as well as studies examining other aspects of sexuality, such as sexual self-efficacy, sexual esteem, sexual interests, sexual knowledge, and hypersexuality.

In sum, there is a clear link between disordered eating and sexuality, but one which is in need of further study. A dimensional classification system, such as HiTOP, provides an empirically derived framework for understanding the instability and comorbidity of internalizing syndromes, and thus has great potential for informing future research on sexuality and disordered eating. Sexuality should be assessed and addressed during eating disorder treatment. This area of inquiry would benefit from collaboration between multiple disciplines, both empirically and clinically.

Compliance with Ethical Standards

Conflict of Interest The authors declare that there are no conflicts of interest.

Human and Animal Rights and Informed Consent This article does not contain any studies with human or animal subjects performed by any of the authors.

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- • Of importance
- •• Of major importance

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