Management of polycystic ovary syndrome must include assessment and treatment of mental health symptoms

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Polycystic ovary syndrome (PCOS) is an endocrine disorder with reproductive and metabolic manifestations affecting millions of women worldwide. The health risks associated with PCOS, however, go beyond physical health. Over the past decade, data have emerged demonstrating a high risk of concurrent mental health conditions, specifically depression and anxiety, but extending into other aspects of psychological health, including body image distress, eating disorders, and sexual dysfunction. International surveys suggest physician knowledge about the mental health associations with PCOS is poor and that patients are often dissatisfied regarding counseling-related psychological issues. We performed a review of mental health comorbidities in individuals with PCOS, including depression, anxiety, body image distress, eating disorders, psychosexual dysfunction, and decreased quality of life, as well as evaluated the impact of common PCOS treatments on these conditions. Most meta-analyses in reproductive age women demonstrate increased risks of these conditions, although data are more limited in adolescents and older adults. In addition, the impact of PCOS treatments on these conditions as well as data on first-line treatments in the PCOS population is limited. All providers involved in the multidimensional care of individuals with PCOS should be aware of these mental health risks to provide appropriate screening, counseling and referral options. Future studies should be designed to evaluate targeted treatment for individuals with PCOS. (Fertil Steril® 2024;121:384–99. ©2024 by American Society for Reproductive Medicine.)

Key Words: PCOS, mental health, depression, anxiety, eating disorder

Polycystic ovary syndrome (PCOS) is a complex endocrine disorder affecting 6%–10% of reproductive age women worldwide (1, 2). The associations with oligomenorrhea, infertility, metabolic syndrome, and their components are well known (3); however, the impact of PCOS is often mistakenly thought to remain primarily in the gynecologic and endocrine spheres. Over the past decade, data have emerged demonstrating a high risk of concurrent mental health conditions, specifically depression and anxiety, in women with PCOS. More recent studies have also focused on a potentially increased prevalence of eating disorders (EDs), body image distress (BID), sexual dysfunction, and decreased quality of life (QoL) (4, 5). Unfortunately, obstetrician-gynecologist physicians and trainees often overlook these mental health conditions when identifying comorbidities associated with PCOS (6, 7), and women with PCOS often report that they are not satisfied with counseling around psychological issues (8).

Recognition of comorbid mental health conditions is particularly important given the interplay between psychological and physical health. Patients with depression are less likely to follow medical treatment recommendations or adhere to lifestyle intervention programs (9, 10). Similarly, a meta-analysis of four weight loss studies in women with PCOS found that baseline depressive symptoms were associated with increased odds of study dropout (11). Thus, identifying patients ahead of time who may have psychological barriers to treatment adherence is important.

In addition to recommendations for lifestyle changes, PCOS management often centers around the medical management of symptoms with oral contraceptive pills (OCPs), spironolactone, or metformin. In a large international survey, only 17% of patients reported satisfaction with the information they received on medical therapy for PCOS (8). An understanding of the interplay between these PCOS-symptom-specific treatment options and the mental health conditions experienced

Received November 16, 2023; revised January 10, 2024; accepted January 11, 2024; published online January 18, 2024.
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Fertility and Sterility® Vol. 121, No. 3, March 2024 0015-0282/$36.00

https://doi.org/10.1016/j.fertnstert.2024.01.018

by women with PCOS might better help clinicians counsel patients on treatment options.

Validated psychological screening tools are readily available for use in clinical practice, yet recognition of the burden of psychological symptoms in PCOS appears limited internationally. In this review, we will examine the associations between PCOS and mental health comorbidities, including depression, anxiety, EDs, BID, psychosexual dysfunction, and decreased QoL, and evaluate the efficacy of treatment options in the population with PCOS.

MATERIALS AND METHODS

We performed a systematic literature review on the prevalence and treatment of the following mental health conditions in women with PCOS: depression, anxiety, EDs, BID, psychosexual dysfunction, and decreased QoL. For each of these six conditions, we performed a separate PubMed search between September 1, 2023, and October 31, 2023, using keywords for PCOS and each individual mental health condition. We included studies that investigated the prevalence of the mental health condition (i.e., depression) in women with PCOS compared with controls or the treatment of the mental health condition using PCOS-specific treatments, such as lifestyle management, OCPs, and insulin sensitizers, or treatment targeted toward the specific mental health condition, such as psychosocial interventions and medication.

When we identified previously published systematic reviews (SRs) or meta-analyses (MAs) on a specific topic (i.e., the impact of lifestyle management on depression symptoms in women with PCOS), we restricted our search to start after the date described in the published SR and MA to focus on identifying more recent studies. In addition, in 2023, international guidelines were published on the diagnosis and management of PCOS, which included some overlap in our search queries. These MAs, cited below, are available in the Technical Report of the International Guidelines (12).

Depression

The World Health Organization ranks depression as the leading contributor to global disability. Depressive disorders are more common in women than men with a global prevalence of 6% in women (13). There are multiple screening tools for depression in the general population which provide a score to categorize depressive symptoms as none, mild, moderate or severe (Table 1) (14, 15).

Prevalence in PCOS. Several MAs have found an increased odds of depressive symptoms in individuals with PCOS (16–18), with a median prevalence of 36.6% (interquartile range [IQR] 22.3%–50.0%) in PCOS compared with 14.2% [10.8%–22.2%] in the control group. (16). A MA of 47 studies found increased odds of depressive symptoms in individuals with PCOS compared with controls in the overall analysis (odds ratio [OR]: 2.59 [95% confidence interval {CI}] 2.11, 3.16), in adults (OR 2.63 [2.12, 3.28], 41 studies), and in adolescents (OR 2.26 [1.36, 3.76], 6 studies) (Table 2) (12, 19). The investigators reported that most studies included in this MA had a moderate or high risk of bias.

When looking at depression severity and other sensitivity analyses, individuals with PCOS have over a six-fold increased odds of moderate to severe depressive symptoms compared with controls (16). In addition, the increased risk of depressive symptoms remained significant when restricting to studies that used clinical assessment to confirm PCOS diagnosis (12), where groups were matched for body mass index (BMI) or age and when patients did or did not stop hormonal medication or metformin ahead of screening (16). These findings support the idea that it is not just these comorbidities and medications that are driving this relationship.

Longitudinal studies. The average age for most of the cross-sectional studies in the above MAs is <30 years (12). Two studies report a higher prevalence of depression in older women with PCOS. A longitudinal, population-based study derived from the Northern Finland Birth Cohort 1966 (N = 2,199) found individuals with presumed PCOS (oligomenorrhea and hirsutism) had higher rates of depressive symptoms then controls at both age 31 years (9.6% vs. 5.3%; P=.003) and age 46 (25.9% vs. 14%; P=.003) (20). A population-based cohort of 1,127 Black and White women participating in Coronary Artery Risk Development in Young Adults (CARDIA) Women's study (CWS) compared rates of depression in individuals with National Institutes of Health criteria for PCOS and without PCOS from ages 20–32 years until age 48–60 years. Although depression decreased with age in all subjects, individuals with PCOS had higher depression scores at all time points compared with those without PCOS. This study extended into the post-menopausal range but did not report on menopause status (21). By contrast, analysis of data from the Study of Women's Health Across the Nation (SWAN), a longitudinal study of women in the United States as they went through menopause (mean age 45 years), did not find an increased prevalence of elevated depression scores in women with presumed PCOS (N = 117) compared with control women (N = 1,186) (29.9% vs. 23.9%; P=.42). The presumed diagnosis of PCOS was based on the highest tertile of total testosterone levels and a history of oligomenorrhea in the reproductive years (22). More studies on women with PCOS who are well-phenotyped during the reproductive years and are followed over time are needed to identify the true prevalence of depression in older women with PCOS.

Impact of race and ethnicity. In a sensitivity analysis evaluating the odds of depressive symptoms in women with PCOS on the basis of continent of study origin, this risk remained significant in the four continents evaluated: America, Asia, Australia, and Europe, with no between-continent differences in risk (16). In our review, we identified three studies that looked at the prevalence of depressive symptoms in different races or ethnic groups. Two studies were based in the United States and did not show differences in Black women with PCOS compared with White women with PCOS (21, 23). A study of 1,008 women with self-reported PCOS in India and the United Kingdom (UK) found that women of non-White ethnicity and those born in India had a higher incidence of depressive symptoms compared with White women and those born in the UK, respectfully. In this analysis, it is difficult to

TABLE 1

Baseline definitions, screening tools, and prevalence of common mental health conditions.

Condition	DSM 5 definition (15)	Examples of screening tools
Depression	Major depressive disorder: exhibiting five (or more) symptoms that have been present during the same 2-week period and represent a change from previous functioning; at least one of the symptoms is either depressed mood or loss of interest or pleasure.	- Beck Depression Inventory - Center for Epidemiologic Studies-Depression - Patient Health Questionnaire
Anxiety	Generalized anxiety disorder: experience of excessive anxiety and worry occurring more days than not for at least 6 months. Typically, anxiety is associated with at least 3 or more additional specific symptoms	- Beck Anxiety Inventory - State-Trait Anxiety Index - Depression Anxiety and Stress Scale - Hospital Anxiety and Depression ScaleAdolescent specific: - Test Anxiety Scale - Schedule for Affective Disorders and Schizophrenia for School-Age Children-Present and Lifetime version
Eating Disorders	Feeding and eating disorders: persistent disturbance of eating or eating-related behavior that results in the altered consumption or absorption of food and that significantly impairs physical health or psychosocial functioning. - Binge eating disorder: recurrent episodes of binge eating (eating a larger amount of food than most people would eat under similar circumstances) that must occur, on average, at least once per week for 3 months - Bulimia nervosa: episodes of binge eating combined with compensatory behaviors to prevent weight gain, such as self-induced vomiting; misuse of laxatives, diuretics, or other medications; fasting; or excessive exercise. - Anorexia nervosa involves restriction of energy intake leading to lower body weight as well as fear of gaining weight and a disturbed perception of body image and weight	- Bulimic Investigatory Test Edinburgh - Eating Attitudes Test-26 and -40 - Eating Disorder Examination Questionnaire - Night Eating Questionnaire - Three Factor Eating Questionnaire
Body image distress	- No DSM-V definition - Body image distress is an individual's psychological experience of the appearance and function of their body, such as the way a person may view, feel, or think about their body	- Body Esteem Scale for Adolescents and Adults - Body Image Concern Inventory - Body Image Scale - Multidimensional Body-Self Relations Questionnaire Appearance Scale - Stunkard Figure Rating Scale - Rosenberg Self-Esteem Scale
Psychosexual dysfunction	- Female sexual arousal/interest disorder: diagnosed on the basis of lack of, or significantly reduced, sexual interest/arousal, at least 3 of 6 specific symptoms - Female orgasmic disorder: diagnosed on the basis of delay, infrequent or lack of orgasm or reduced sensationGenito-pelvic pain/penetration disorder – diagnosed on the basis of persistent or recurrent difficulties with vaginal penetration For all disorder details, symptoms must (A) be experienced 75%–100% of the time, (B) last for at least 6 months, and (C) have caused significant distress	- Female Sexual Function Index - Female Sexual Distress Scale-Revised
Decreased QoL	- No DSM-V definition - Per International Guidelines: QoL relates to patient-reported physical, social, and emotional effects of a condition and its associated treatments	PCOS-specific: - PCOS quality of life and Modified General: - Short Form Health Survey - World Health Organization Quality of Life Brief Version - PCOS the Pediatric Quality of Life Inventory

DSM-V = Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition; QoL = quality of life.

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distinguish the impact of ethnicity compared with country of origin because none of the women from India identified as White, although >85% of those in the UK identified as White (24).

Impact of current PCOS treatments

Lifestyle interventions. Lifestyle interventions are effective in decreasing weight and improving total testosterone levels and hirsutism scores in individuals with PCOS (25, 26), and

TABLE 2

Odds of mental health conditions in women with PCOS compared with controls.

Condition	OR or MD with (95% confidence interval) (12, 19)
Depressive symptoms	- Overall: OR: 2.59 (2.11, 3.16); 47 studies - Adults: OR 2.63 (2.12, 3.28); 41 studies - Adolescents: OR 2.26 (1.36, 3.76); 6 studies
Anxiety symptoms	- Overall: OR 2.67 (2.08–3.44); 27 studies - Adults: OR 2.94 (2.31–3.75); 23 studies - Adolescents: OR 0.92 (0.11–7.96); 3 studies
Eating disorders	- All eating disorders: OR: 1.53 (1.29, 1.82); 10 studies - Bulimia nervosa: OR: 1.34 (1.17, 1.54); 6 studies - Binge eating disorder: OR: 2.09 (1.18, 3.75); 5 studies - Anorexia nervosa: OR: 0.94 (0.69, 1.28); 5 studies - Disordered eating: OR: 1.77 (0.63, 4.91); 6 studies
Body image distress	Body image concerns - MBSRQ - AS subdomains - Appearance evaluation: MD: −0.78 (−0.90, −0.65); 3 studies - Overweight preoccupation: MD: +0.60 (0.42, 0.78); 2 studies - Appearance orientation: MD: +0.22 (0.07, 0.36); 3 studies - Body areas satisfaction: MD: −0.55 (−0.65, −0.45); 2 studies - Body weight classification: MD: +0.54 (+0.25, +0.55); 2 studies Body image concerns- BESAA subdomains - Appearance: MD: −0.29 (−1.92, +1.34); 2 studies - Weight: MD: −2.04 (−3.93, −0.15); 2 studies - Attribution: MD: −0.75 (−2.34, +0.84); 2 studies
Psychosexual dysfunction	- FSFI: Total sexual function: MD: −2.42 (−3.26, −1.58); 17 studies - Sexual desire: MD: −0.22 (−0.47, 0.03); 16 studies - Sexual arousal: MD: −0.36 (−0.59, −0.13); 14 studies - Lubrication: MD: −0.47 (−0.75, −0.20); 14 studies - Orgasm: MD: −0.35 (−0.52, −0.17); 14 studies - Satisfaction: MD: −1.48 (−2.21, −0.75); 19 studies - Pain: MD: −0.27 (−0.57, 0.03); 13 studies
Decreased quality of life	Individual PCOSQ domain scores (3 studies for each) - Emotions: MD: −1.65 (−2.93, −0.36) - Hirsutism: MD: −2.09 (−3.49, −0.70) - Body weight: MD: −1.79 (−3.45, −0.12) - Infertility: MD: −1.66 (−3.44, −0.11) - Menstrual disorders: MD: −1.63 (−3.45, 0.19)

BESAA = Body Esteem Scale for Adolescents and Adults; FSFI = Female Sexual Function Index; MBSRQ-AS = Multidimensional Body-Self Relations Questionnaire Appearance Scale; MD = mean difference; OR = odds ratio; PCOS = polycystic ovary syndrome; PCOSQ = PCOS quality of life.

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thus are interventions that may improve depressive symptoms associated with these risk factors. However, most studies on lifestyle interventions are focused on weight loss or changes in metabolic parameters, such as insulin resistance, diabetes, or dyslipidemia, and do not perform depression screening.

Lifestyle interventions—exercise. In a SR, five of eight studies (27) reported a significant reduction in depressive scores with exercise; however, these were within-group differences. (28–32) Only two studies showed an improvement in the intervention group compared with control (28, 31), with the largest trial (N = 87) showing improvement in depression scores with both continuous aerobic training and intermittent aerobic training compared with control (no exercise) (28). Recently, two studies showed an improvement in depressive symptoms in overweight women with PCOS after using high-intensive interval training compared with a control group (33, 34). Together, these studies suggest that a lifestyle intervention program that includes exercise could improve depression symptoms in women with PCOS, although it is unclear whether there is a specific type of exercise program that is preferable.

Lifestyle interventions—dietary. Nutrition counseling is often part of the lifestyle interventions component of exercise programs recommended for women with PCOS. One study found improvement in depressive symptoms with a high-protein low-carbohydrate diet compared with a low-protein high-carbohydrate diet, despite no difference in weight loss between groups (35).

Lifestyle interventions—combined treatment. A recent randomized controlled trial (RCT) of women with self-reported PCOS living in Syria and Jordan (N = 118) found a significant improvement in depressive symptoms after 4 months in the group who received counseling on physical exercise, stress reduction with breathing exercises, and dietary advice by a clinical pharmacist when they were picking up prescribed medication compared with those who just received standard counseling (36).

Lifestyle interventions—weight loss pharmacotherapy. More recent treatment of obesity and metabolic dysfunction in women with PCOS has focused on the use of glucagon-like peptide-1 receptor (GLP-1R) agonists or dual GIP/GLP-1 receptor agonists. A MA in the general population (five studies, 2,071 participants) found improvement in depressive symptoms in the group treated with GLP-1R agonists compared with controls (37). The only study looking at the impact of GLP-1R agonists on depression symptoms in women with PCOS (N = 19) treated women with liraglutide and showed improvement in psychological health on the World Health Organization Quality of Life Brief Version questionnaire, but not the percentage who screened positive for depression symptoms (38).

A secondary analysis was performed of a three-arm RCT evaluating the effects of OCPs, a lifestyle modification program (LSM), or a combined OCP and LSM program on live birth rates (OWL PCOS study). The LSM intervention was an intensive regimen that included caloric restriction with a meal replacement product, recommendations on physical activity, and the use of a weight loss medication, either sibutramine or orlistat. A nonsignificant decrease in the prevalence of depressive symptoms was noted in the LSM group (22.7%–15.9%; P=.17) (39). Given the promising data in the general population, it is likely that weight loss medications, such as GLP-1R agonists, will help with depressive symptoms in women with PCOS.

Oral combined contraceptive pills. Oral contraceptive pills are the mainstay of treatment for irregular bleeding and hirsutism associated with PCOS and have been shown to improve hirsutism and lower testosterone levels (19). Reassuringly, a network MA in the general population of 14 trials (N = 5,833) found that, compared with placebo, hormonal contraceptive use did not cause worsening of depressive symptoms (40).

That data in women with PCOS are limited to two studies. In the afore mentioned OWL PCOS study, the OCP group (20 μg ethinyl estradiol/1 mg norethindrone acetate) had a significant improvement in the prevalence of depressive symptoms after 16 weeks (13.3%–4.4%; P< .05) (39). Conversely, a nonrandomized prospective study (N = 36) found no improvement in depressive scores after 6 months of OCP treatment (30 μg ethinyl estradiol/3 mg drospirenone) (41).

Insulin-sensitizing agents. Individuals with PCOS and depression have an increased risk of insulin resistance (16, 42); thus, there is a plausibility that treatment with insulin sensitizers could influence depressive symptoms. In a RCT from Jordan and Saudi Arabia, the LSM and metformin (850 mg twice a day) group (N = 53) had 70% lower odds of having major depressive symptoms after 3 months than LS alone (N = 33) (43). A prospective, non-randomized study found that after 3-months of metformin (1,500 mg/d), the severity of depression symptoms decreased in both the adolescent (N = 19) and adult (N = 25) groups (44). Recently, a 6-month RCT found no significant improvement in depressive symptoms in women randomized to either metformin (up to 2,000 mg per day) or myo-inositol (2 mg), a naturally occurring insulin sensitizer (45).

Antiinflammatory agents have been shown to have promise for the treatment of major depression and bipolar depression in the general population (46–49). In women with PCOS, a small (N = 50) study found that pioglitazone, which has insulin-sensitizing and antiinflammatory properties, improved depression scores compared with metformin after 6 weeks (50). Another RCT (N = 111) showed improvement in depression symptoms with cotreatment with 45 mg of pioglitazone and 1,500 mg of metformin daily compared with metformin alone or placebo (51). Both of these studies showed improvement in the inflammatory parameters, although they did not correlate these changes with changes in depression symptoms (50, 51).

Combined treatment. A prospective cohort study evaluated changes in depression scores in individuals with PCOS (N = 33) who received 12 weeks of treatment, including OCPs, metformin, and spironolactone. They found improvement in depressive symptoms in the PCOS group but not in the non-PCOS control group, although the sample size was too small to detect between-group differences (52).

The limitations of most studies looking at the impact of PCOS-specific treatment on depressive symptoms are that depressive symptoms are often a secondary outcome rather than a primary outcome and that follow-up time is often short, 16 weeks rather than a year. In addition, the patient populations are often very restricted, i.e., individuals with PCOS and infertility undergoing ovulation induction, rather than representative of the general population. Despite this, it is encouraging that none of the PCOS-specific treatments increase the risk of depressive symptoms.

Specific treatments

Psychosocial interventions. Cognitive behavioral therapy (CBT) is recommended by the American Psychological Association and the American College of Physicians as a first-line treatment for depression (53–55), and a MA in the general population showed moderate to large treatment effects for both major depressive disorder and generalized anxiety disorder (GAD) (56).

In women with PCOS, a MA of five RCTs found a large positive effect of CBT (N = 136) compared with usual care (N = 136) for treatment of depressive symptoms (overall Cohen's d effect size of 1.02 [0.02, 2.02]) (57). One recent RCT (N = 84) also found that CBT was effective in reducing depression (58). Unfortunately, there is no standardized CBT regimen. The duration of treatment in the included trials ranged from 8–52 weeks and involved between 8 and 20 sessions that lasted between 30 and 150 minutes per session.

Psychiatric medication. Despite antidepressants such as selective serotonin reuptake inhibitors (SSRIs) being commonly used to treat depression, there are minimal data on their efficacy in women with PCOS. One RCT of women with PCOS and mild-to-moderate depression at baseline (N = 74) found improvement in depression scores at 6 weeks in those who received sertraline (25 mg) compared with placebo (59).

Anxiety

The prevalence of generalized anxiety disorder varies by country, gender, and age, with a combined lifetime prevalence of 3.7%. The prevalence is generally higher in women

than men with various screening tools available for assessing symptoms (Table 1) (15, 60, 61).

Prevalence in PCOS. A MA of 27 studies reported the prevalence of anxiety in women with PCOS to be up to 76.7%, with a higher risk of anxiety in PCOS (OR 2.67 [2.08–3.44]) compared with those without PCOS (Table 2) (12, 19). Similar to depression, there are higher odds of moderate to severe anxiety symptoms in PCOS compared with controls (OR 6.55 [2.87, 14.93], five studies) (16). There was no clear increase in the prevalence of anxiety in adolescents (OR 0.92 [0.11–7.96], three studies) (Table 2), but data are limited (12, 19).

In a meta-regression, individuals with PCOS and concurrent anxiety had a higher mean BMI, hirsutism scores, and free testosterone-free androgen index, but not insulin resistance, compared with those who did not have anxiety. This same study did not find an association between anxiety and hirsutism (16). Body image distress, which is discussed later in this review, may also correlate with anxiety (62, 63).

Longitudinal studies. In the Northern Finland Birth Cohort study, the median anxiety score was higher in women with PCOS compared with controls at both age 31 and 46 years; however, when looking at the percentage of those with an elevated score, differences between PCOS and control disappeared by age 46 (16.1% vs. 8.2% at age 31 years; 12.8% vs. 8.3% at age 46 years) (20).

Impact of race and ethnicity. Although racial differences in the prevalence of anxiety are documented in the general population (64), there is limited evidence within the PCOS population. In a cross-sectional US-based study of 272 women with PCOS and 295 controls, White women with PCOS had a significantly higher prevalence of anxiety compared with Black women with PCOS (75.9% vs. 61.3%, adjusted OR 2.21 [1.17–4.19]) (23). A cross-sectional study of 1,008 women with PCOS conducted in the UK and India found that women born in India had higher rates of anxiety compared with women born in the UK, but there was no difference in anxiety when comparing White ethnicity to non-White ethnicity, suggesting differences were more related to country of origin than ethnicity (24).

Impact of current PCOS treatments

Lifestyle interventions-exercise. In a 2021 systematic review, three of six studies exploring exercise interventions on mental health in women with PCOS found significant improvements in anxiety symptoms after the intervention; however, these were within-group reductions (27). In the secondary analysis of the OWL PCOS study, anxiety scores decreased significantly after 16 weeks of lifestyle intervention, which included a component of increased activity up to 150 minutes per week (OR 0.30 [0.10−0.85]) (39). However, a trial comparing acupuncture to exercise or no intervention found no improvements in anxiety scores in the exercise group at either 16 or 32 weeks (65). Unfortunately, conflicting findings and heterogeneity in forms of interventions such as aerobic exercise vs. resistance training limit the ability to draw firm conclusions.

Lifestyle interventions—dietary. In the study comparing diets, neither the high-protein low-carbohydrate nor the low-protein high-carbohydrate diets resulted in improvements in anxiety (35). An RCT of women with PCOS (N = 55) found significant reductions in anxiety scores after 12 weeks in the group receiving coenzyme Q10 (100 mg/d) compared with placebo (66); however, these findings need to be replicated and the optimal dose or treatment duration remains unclear.

Oral contraceptive pills. In the general population, a secondary analysis of an RCT comparing OCPs to placebo found that among women without a history of mental health problems, there was no impact of OCPs on anxiety scores, but that among women with a current or prior psychiatric history, there was an increase in anxiety scores after 3 months of OCP therapy (67). In addition, OCP therapy may reduce the effectiveness of certain exposure therapies, as indicated by less pronounced decreases in subjective indices of fear in those using OCPs versus those not on OCPs after exposure therapy for agoraphobia (68). A prospective observational study of women with PCOS (N = 36) did not find significant changes in the mean anxiety score after 6 months of OCP therapy (41). Furthermore, the secondary analysis of OWL PCOS also did not demonstrate an association between OCPs and anxiety (OR 0.32 [0.06–1.64]) (39).

Insulin-modifying agents. There is conflicting evidence as to the effect of drugs such as GLP-1R agonists or metformin on anxiety in the general population (69–71), and the evidence within the PCOS population is even more sparse. A prospective study in China of patients with PCOS and psychological distress found that patients on a pioglitazone-metformin combined medication had significantly decreased anxiety symptom severity after 12 weeks of therapy, whereas those on metformin alone or placebo showed no change in scores (51). In contrast, the aforementioned pilot trial of 19 adolescents and 25 adults with PCOS found significant reductions in anxiety symptoms after 3 months of metformin (44). These studies are hindered, however, by small sample sizes and heterogeneous populations.

Specific treatments

Psychosocial interventions. As with depression, CBT is considered highly effective and one of the first-line treatment options for anxiety disorders (56, 72). Other forms of mindfulness-based therapies include mindfulness-based stress reduction (MBSR) or cognitive therapy, which may be just as effective as CBT (73). A 2022 systematic review of three RCTs evaluating a psychosocial intervention in women with PCOS found improvement in anxiety symptoms with the intervention in all studies, but there was no difference when compared with the control group (74). In a recent RCT of 84 women with PCOS, those receiving CBT for eight weekly sessions had significantly lower anxiety scores compared with controls (75). A second RCT of 42 women with PCOS randomized to a 2-month MBSR program consisting of therapist-led group and individual discussions, exercises, and techniques, such as practicing mindfulness in relation to breathing found that the severity of anxiety symptoms was significantly

decreased both post-intervention and at a 6-month follow-up (76).

Yoga has also been proposed as a method to reduce anxiety in this population (77). A 2022 review found promising, albeit low-quality, evidence and recommended well-designed RCTs to corroborate these findings (78). In the adolescent population, a RCT in India of 90 adolescents with PCOS found that after 12 weeks of a daily holistic yoga module (90 1-hour sessions), the State-Trait Anxiety Inventory trait anxiety scores were significantly reduced in the intervention group compared with controls, although state anxiety scores were not (79). Larger RCTs are needed to assess the various techniques and determine what length and method of treatment would be most effective for those with PCOS.

Psychiatric medications. There are no studies evaluating the efficacy of antianxiety medications such as SSRIs in treating women with PCOS.

Eating Disorders

The most common eating disorders (EDs) are binge eating disorder (BED), bulimia nervosa (BN), and anorexia nervosa (AN) (Table 1) (15). The lifetime prevalence of BED is 1.25 to 3.5% in US women (80). Bulimia nervosa and AN each have a prevalence of $<1\%$ (15). The median age of onset of BED and BN is in the early 20s, which is often when many patients are first diagnosed with PCOS (80).

Prevalence in PCOS. The prevalence of any ED in individuals with PCOS ranges from 2.8% to 23.3%, but the methods for diagnosis varied from self-reported validated ED questionnaires to psychiatric evaluation (81). A MA of 11 studies found increased odds of any ED in the overall analysis (OR 1.53 [1.29, 1.82]) (Table 2) and the sensitivity analysis when only including studies that used strict Rotterdam criteria for PCOS diagnosis (rather than self-report) (OR 2.88 [1.55, 5.34], four studies) (12, 19). When looking at individual EDs, there are increased odds of BED and BN, but not anorexia (Table 2) (12, 19). There have been no additional studies published looking at the prevalence of ED in PCOS since this MA. One study of adolescents (age 13–18 years, N = 129) showed no difference in BED score or diagnosis of BED in individuals with PCOS and age-matched controls recruited from a pediatric gynecology clinic in Latvia (82). There are no studies looking at the prevalence of EDs on the basis of race and ethnicity or in older women with PCOS.

Impact of current PCOS treatments

Lifestyle interventions. Studies on lifestyle management in the general population have shown improvement in eating behaviors (83, 84); however, there are also data that restricted diets are a significant contributor to binge eating (85). Thus, a focus on weight loss can be counterproductive for individuals with PCOS who have an ED or are at risk for disordered eating.

It has been proposed that a "weight-neutral approach" that is focused on mindful eating and self-care rather than dietary restriction could be helpful to balance these risks (86). However, this has not been studied specifically in individuals with PCOS. Small studies in the general population have demonstrated improvements in binge eating behaviors after treatment with GLP-1R agonists (87–89). Similarly, a small prospective study of women with PCOS and obesity (N = 36) showed improvement in uncontrolled eating and emotional eating scores after 12 weeks of treatment with liraglutide (90).

Oral contraceptive pills. Postovulatory hormone changes may lead to a peak in food intake and emotional eating, whereas during the preovulatory phase, the risk of binge eating is lower (91). A review of the general population found that the data were mixed and concluded that there were few good-quality studies to determine whether there was a direct impact of OCPs on disordered eating (91). There are no studies evaluating the impact of OCPs on disordered eating in women with PCOS.

Insulin-sensitizing agents. There are no RCTs investigating the impact of metformin on ED in either the general population or women with PCOS.

Specific treatments

Psychosocial interventions. Family therapy is often recommended for adolescents with AN, while cognitive behavior therapy for eating disorders has been well studied in adults with ED (92, 93).

The only study looking at the impact of CBT on disordered eating in individuals with PCOS was a longitudinal RCT measuring the effectiveness of a lifestyle intervention program in women with a BMI > 25 kg/m^2 (N = 183) that included 1 year of 20 group sessions of CBT combined with nutritional advice and exercise with or without additional feedback through Short Message Service (94). The Eating Disorder Examination Questionnaire global scores worsened in the usual care control group and improved in the lifestyle intervention group at 12 months. No significant differences were observed in lifestyle intervention with or without Short Message Service. Weight loss did not mediate the changes in eating behavior (57). There are no studies investigating the use of cognitive behavior therapy for EDs to treat EDs in individuals with PCOS as a primary outcome.

Body Image Distress

Body image distress is not defined within the Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition (DSM-V), but in the literature refers to an individual's psychological experience of the appearance and function of their body, such as the way a person may view, feel, or think about their body (Table 1) (15, 95). Within the population with PCOS, it has been linked to increased depression and anxiety symptoms as well as EDs (96).

Prevalence in PCOS. In a 2023 systematic review of nine studies and MA of three studies using the Multidimensional Body-Self Relation Questionnaire, women with PCOS scored lower than women without PCOS for appearance evaluation and body satisfaction and higher for appearance orientation, consistent with worse body image (Table 2) (12, 19). The MA of two studies using the Body Esteem Scale for Adolescents and Adults scale showed lower scores for the weight subscale but not the appearance or attribution subscales (Table 2) (12,

19, 96). In adolescents, there are only a few cross-sectional studies with conflicting results (97–100).

Several studies have found positive correlations between body image scores and BMI, with women with a higher BMI having more dissatisfaction (62, 63, 101, 102). In contrast, one study found body dissatisfaction was strongly associated with depression in the lean cohort and not in the obese cohort (P=.04) (103). The role of androgens is suggested by positive correlations between the Ferriman-Gallwey score or hirsutism and poor body image scores (62, 101, 104), and higher BID in the hyperandrogenic phenotypes of PCOS (101). Several studies have found an association between body dissatisfaction and depression and anxiety, with worse body image meditating the association between depression and anxiety in women with PCOS (62).

Impact of race and ethnicity. In the previously mentioned cross-sectional study of women with PCOS conducted in the UK and India, women of non-White ethnicity and those born in India had lower rates of body dysmorphic disorder than White women or women born in the UK, respectfully (OR 0.57 [0.41–0.79] and OR 0.42 [0.29–0.61]) (24).

Impact of Current PCOS treatments

Lifestyle interventions. In a secondary analysis of an RCT conducted on 87 women with PCOS in Brazil, women randomized to either the continuous or aerobic exercise training intervention groups had no significant differences in body image. The dissatisfaction grade on the Body Shape Questionnaire, however, improved in the continuous exercise arm compared with controls as well as improved within both exercise groups after interventions (28). Body image may also improve with lifestyle interventions independent of weight loss. In an observational study in the UK, women with PCOS (N = 23) who completed a 6-month exercise regimen consisting of brisk walking titrated to 30 minutes per day, had significantly lower scores for BID compared with those who did not complete the intervention (N = 11) despite no change in BMI (105). Similarly, a three-arm RCT of 155 women with PCOS found that those in the lifestyle intervention and CBT arms had significantly improved body image scores over the course of 12 months, which was not mediated by weight loss (94).

Oral contraceptive pills and insulin-sensitizing agents. Our review did not identify studies within the PCOS population evaluating the impact of OCPs or insulin-sensitizing agents on BID.

Specific treatments

Psychosocial interventions. Cognitive behavioral therapy and other psychosocial interventions are recommended as treatments within the general population (106–108) A meta-analytic review of stand-alone interventions to address body image found that techniques such as discussing the role of cognitions in body image, changing negative body language, and restructuring cognitions all improved body image, as did relapse prevention and stress management training (109). Studies within the population with PCOS using this approach are limited. In a randomized trial of 52 Iranian adult women with PCOS receiving either 8 weekly sessions of acceptance and commitment therapy or placebo, body image was significantly better in the intervention arm (110). As discussed previously, a three-arm RCT of lifestyle combined with CBT improved body image compared with care as usual (94).

Psychiatric medications. Our review did not identify studies assessing the use of psychiatric medications in treating women with PCOS and BID. However, in the general population, SSRIs are often considered first-line treatment along with CBT (111).

Quality of Life

Quality of life relates to the patient's reported physical, social, and emotional effects of a condition and its associated treatments (Table 1) (15, 19). Although generic screening tools such as the SF-36 exist, they focus on infective illness and issues such as mobility and impact on work; therefore, PCOS-specific tools such as the PCOS QoL (PCOSQ) or the modified PCOSQ (MPCOSQ) are preferred, which are what we focus on here (Table 1) (12, 15, 112, 113).

Prevalence in PCOS. In adults with PCOS compared with controls, a MA of 36 studies found that although total PCOSQ scores were not different, individual domain scores were all lower in those with PCOS (Table 2) (12, 19). However, the certainty of these findings was rated as low to very low (12). Poor health-related QoL (HRQOL) appears to continue into older ages, with one longitudinal assessment using the Northern Finland Birth Cohort showing impaired HRQOL persisted from ages 31–46 years (114).

In adults with PCOS, the highest effects on MPCOSQ scores are exerted by issues with body image, self-esteem, and sexual function (115). Studies have demonstrated that dysmorphic concerns and ED symptoms mediate the relationship between BMI and PCOSQ scores, tying into the concept that excess body weight is one of the main factors contributing to impaired QoL (116).

When investigating adolescents with PCOS, a systematic review in 2020 (11 studies, N = 512) found lower scores in the PCOS group but noted limitations because of small sample sizes and significant variation in study designs (eg, whether there were comparisons with controls, varying interventions, assessment tools, and controlling for factors such as BMI) (117). In a recent MA of studies using the Pediatric Quality of Life Inventory TM questionnaire (two studies, N = 169) (Table 2) (12, 19), there were no differences in total scores in adolescents with PCOS compared with controls (12), but data are still limited given the small numbers.

In adolescents, a systematic review of nine studies found that body weight issues and BMI have the strongest effect on HRQOL (118). Another study in adolescents found serum free testosterone levels to be negatively correlated with Pediatric Quality of Life Inventory TM scores (119).

Impact of race and ethnicity. In a cross-sectional survey of 272 women with PCOS and 295 controls, there were no racial differences in total MPCOSQ scores. However, the infertility domain score was significantly lower in Black women with PCOS compared with White women with PCOS (mean 12.6

vs. 17.5, P=.001) (23). In a cross-sectional study of 42 South Asian and 129 Caucasian women diagnosed with PCOS residing in the UK, overall mean scores for the PCOSQ were largely similar between groups, with menstrual irregularity being of the least concern in South Asian women compared with Caucasians (120).

Impact of current PCOS treatments

Lifestyle interventions. A 2021 systematic review (eight studies) found that despite varied exercise techniques and duration, nearly all the studies reported improvements from exercise across multiple PCOSQ domains, with the weight and emotions domain being the most clinically significant (27). Although some studies showed that weight loss directly correlates to the degree of improvements in QoL (121), other studies have found significant improvements in PCOSQ scores despite no significant changes in BMI (122). A recent 2023 RCT comparing high-intensive interval training to moderate-intensity continuous training in 29 overweight women with PCOS found significant improvements in various domains of the PCOSQ within each arm but no significant between-group differences, consistent with prior findings that there is no one exercise approach that is superior to others (33).

A secondary analysis of an RCT of women with PCOS (N = 72) assigned to either acupuncture, exercise or no intervention found improvement in the PCOSQ emotions and infertility domain scores in the exercise group after 16 weeks, but only the infertility domain was different from the control group (65). The secondary analysis of the OWL PCOS trial found significant improvements in the weight, infertility and menstrual domains in the LS group (39)

Oral contraceptive pills. A 2023 systematic review of RCTs evaluating the impact of OCPs compared with no medication on QoL in women with PCOS only included one study that did demonstrate an improvement in QoL (mean difference 1.2 [0.96, 1.44]), but the certainty of the evidence was very low (123). The secondary analysis of the OWL PCOS trial also demonstrated significant improvements in all PCOSQ domain scores with OCP compared with baseline. In addition, the combined group (OCP and lifestyle intervention) had improvements in body hair, weight, and infertility domains compared with a single treatment group (either OCP or lifestyle intervention alone), suggesting that combination therapy offers additional QoL benefits (39).

Insulin-sensitizing agents. The impact of insulin-sensitizing agents like metformin has been largely conflicting in the population with PCOS, with most studies using general population surveys instead of the PCOSQ and MPCOSQ (124). A prospective study in Taiwan of 109 women with PCOS found significantly improved scores in the acne and hair loss domains of the Chinese PCOSQ after 6 months of treatment with metformin. In the subgroup analysis, significant improvements appeared only for the overweight and hyperandrogenic subgroups (125). In contrast, an RCT of overweight and obese adult PCOS women randomized to metformin or a metformin, myoinositol, and d-chiro-insoitol complex found significant improvements in the PCOSQ in the combination group despite no differences in changes in BMI, testosterone, or insulin marker levels between groups (126). Given the small sample sizes of studies and the conflicting associations with biochemical or clinical parameters, it is difficult to determine how beneficial metformin or myoinositol are. We found no data on GLP-1R agonists' effect on PCOSQ and MPCOSQ scores. In the adolescent population, a prospective RCT of 36 obese adolescents randomized to OCPs with lifestyle intervention or metformin with lifestyle intervention did not find significant differences in PCOSQ scores between groups (127).

Specific treatments

Psychosocial interventions. Although promising, CBT has shown conflicting results in terms of its impact on QoL. While a 2022 systematic review of RCTs found four studies evaluating QoL outcomes and did not report improvements (74), two studies in this review used non-CBT interventions like MBSR (128) and one of the included studies did not appear to be exclusively in those with PCOS (129). A 2022 MA on the effects of CBT in women with PCOS found that when compared with lifestyle intervention or routine treatment, CBT had benefit in QoL related to hirsutism (standardized mean difference 0.92 [0.48, 1.35], 2 studies), but not overall QoL (standardized mean difference 1.24 [−0.44, 2.92], 2 studies) (59). Although both included studies utilizing CBT showed improvements in the intervention group (130), in one it was not sustained at a 16-week follow-up (131). Since then, an RCT of 84 women with PCOS randomized to eight sessions of CBT found PCOSQ scores to be significantly higher in the intervention group (standardized mean difference 19.25 [17.66−20.84]) (75).

It has been also suggested that peer-led support groups may be more beneficial compared with general counseling, with one experimental study finding significant HRQOL improvements in those allocated to 10 weeks of a peer support program compared with controls (132). A RCT in Greece explored the impact of an 8-week mindfulness stress management program on QoL in women with PCOS (N = 23), with significant improvements in PCOSQ scores (133). In a secondary analysis of an RCT containing >900 patients, those randomized to 4 months of acupuncture did not have significantly different PCOSQ scores compared with the sham group (134). Yoga has also shown benefit in both adult and adolescent populations, albeit in studies with small sample sizes and varying intervention techniques (77).

Psychiatric medications. This review did not identify any studies assessing the impact of specific psychiatric medications on QoL scores in women with PCOS.

Psychosexual Health

The DSM-V includes female sexual arousal and interest disorder, female orgasmic disorder, and genito-pelvic pain and penetration disorder (Table 1) (15).

Prevalence in PCOS. Individuals with PCOS have a decreased QoL and an increased risk of depression, anxiety, and BID, which can be associated with an increased risk of poor psychosexual health. Sexual health can also be impaired by obesity, metabolic syndrome, and poor body image, factors that are commonly present in individuals with PCOS (135, 136).

A MA of 27 studies found that individuals with PCOS had lower total sexual function (sexual arousal, lubrication, and orgasm) on the Female Sexual Function Index (FSFI) (Table 2) (12, 19). The four studies that used a visual analogue scale tool all showed reduced sex life satisfaction and perceptions of sexual attractiveness. Sensitivity analysis on the basis of BMI (mixed BMI or not reported, overweight and obese BMI vs. lean BMI) showed that the results remained significant for total sexual function, lubrication, and orgasm. No differences were found in the reported frequency of sexual thoughts and fantasies or the importance of sexual satisfaction or pain during intercourse between individuals with PCOS and controls (12). However, the prevalence of sexual dysfunction could not be calculated as the studies did not determine whether these symptoms caused significant distress as required by the DSM-V.

Impact of Race and Ethnicity

The above study of women with PCOS in India and the UK found that women of non-White ethnicity and those born in India had lower FSFI scores compared with White women and those born in the UK, respectfully. As previously mentioned, all women in India were of non-White origin (24).

Two studies evaluated the prevalence of abnormal FSFI scores in different PCOS phenotypes (A: oligo-ovulation or anovulation (OA) + hyperandrogenism (HA) + polycystic ovaries (PCO); B: OA + HA; C: HA + PCO; D: OA + PCO). A cross-sectional study of Chinese women with PCOS (N = 910) and controls (N = 468) found that phenotype A had a lower total FSFI mean score compared with phenotype D and controls. Phenotypes A and B had a higher risk of female sexual dysfunction compared with controls and phenotypes C and D (137). Another study of Iranian women with PCOS (N = 364) and controls (N = 100) found that all PCOS phenotypes had a lower total FSFI mean score compared with controls but that phenotype B was the lowest compared with the other phenotypes, and there were no differences between phenotypes A, C and D (138).

Impact of current PCOS treatments

Lifestyle interventions. In the general population, physical activity and a healthy diet are associated with a lower risk of female sexual dysfunction (139–141). In women with PCOS, two studies (28, 29) that included four parallel groups: physical resistance training ((N = 43), continuous aerobic training (N = 23), intermittent aerobic training (N = 22), or control (N = 24) found improvement in total FSFI score and FSFI desire score after 16 weeks in all intervention groups compared with control. The continuous aerobic training group also had improvements in arousal and pain scores; the intermittent aerobic training group had improvements in lubrication and orgasm scores; and the physical resistance training group had improvements in desire, lubrication, and satisfaction scores. They concluded that all training programs improved levels of sexual function (142).

In the OWL PCOS study, there was no change in total FSFI score in any treatment group at 16 weeks compared with baseline, but there was an increase in the FSFI desire domain subscore in the lifestyle intervention and combined groups. When analyzing the individuals with elevated FSFI scores at baseline (N = 33), total FSFI scores improved in the lifestyle intervention and combined treatment groups, which was driven by significant improvements in the arousal domain in the lifestyle intervention group and the desire and satisfaction domains in the combined group. There was also improvement in Female Sexual Distress Scale-Revised scores (which measure distress) in both the Lifestyle intervention and combined groups (143).

Oral contraceptive pills. The 2019 position statement from the European Society of Sexual Medicine reports that the effects of hormonal contraception on sexual function remain controversial (144). A MA of the general population (12 studies) did not find a significant difference in the total FSFI scores between contraceptive users and nonusers. The only subscale that was different between groups was the sexual desire subscale, which was lower in contraceptive users (145). The only study looking at OCP use in women with PCOS was the secondary analysis of the OWL PCOS study. There were no changes in total FSFI scores or subdomain scores in the OCP group (143).

Insulin-sensitizing agents. In women with prediabetes or diabetes, metformin improves FSFI scores (146). A prospective study of women with PCOS (N = 64) who all received metformin (dosing ranging from 500 mg twice a day to 1,000 mg twice a day on the basis of BMI) found improvements in satisfaction with sex life and less pain during sexual intercourse after treatment, although there was no nonmetformin control group (147).

Specific treatment. Treatment of sexual dysfunction is complex given that multiple disorders can coexist, the etiology is often multifactorial, and there is the presence of comorbid depression and anxiety. The therapeutic algorithm comprises a multidisciplinary approach, including pharmacologic and nonpharmacologic management, which includes counseling, lifestyle changes, improving body image, and treating pelvic floor dysfunction. Our review did not identify additional studies looking at psychologic or pharmacologic interventions for the treatment of sexual dysfunction in individuals with PCOS.

DISCUSSION

Our review of the literature, which includes the updated 2023 International PCOS guidelines (12, 19), suggests that there is good evidence to support an increased risk of depressive and anxiety symptoms, EDs, BID, psychosexual dysfunction, and decreased QoL in adult women with PCOS. Of these, the data on depression are the most robust and shows that this risk begins in adolescence and extends beyond the reproductive years. The major limitation of most studies included in the MAs is the use of screening questionnaires rather than confirmed diagnoses. In addition, most studies are cross-sectional, with a high risk of bias. Larger longitudinal studies with prospective recruitment from unselected populations of women with PCOS are needed to better characterize mental health conditions in adolescents, adults, and through menopause.

TABLE 3

Summary of recommendations from the 2023 International Guidelines.

Condition	Screening/awareness (12, 19)	Treatment
Depression and anxiety	- Adolescents with PCOS should be screened for depression. - Adults should be screened for both depression and anxiety. - Screening should be performed using regionally validated tools at the time of diagnosis and repeat screening intervals should be on the basis of clinical judgment, risk factors, comorbidities, and life events, including the perinatal period.	- Psychological therapy should be offered as first-line treatment for treatment of diagnosed depression, anxiety, and/or eating disorders. - If disordered eating, body image distress, low self-esteem, problems with feminine identity, or psychosexual dysfunction are diagnosed, evidence-based treatment including CBT should be offered. - Antidepressant medication can be considered on the basis of general population guidelines.
Eating disorders	- Eating disorders and disordered eating should be considered in PCOS, regardless of weight, especially in the context of weight management and lifestyle interventions. - If disordered eating or eating disorders as suspected, a referral should be made for diagnostic interviews.	- If medication is used to treat depression or anxiety, side effects should be considered, especially the risk of weight gain. - Lifestyle interventions and PCOS-specific treatment (OCPs, metformin, laser hair removal) should be considered given their potential to improve psychological symptoms.
Body image	- Health care professionals should be aware that features of PCOS can have a negative impact on body image. - There are no clear recommendations on the frequency of screening.	- Health care professionals should be aware that not treating depression and anxiety may decrease patient compliance with other PCOS-specific treatments.
Psychosexual health	- Permission should be sought to discuss psychosexual health with patients with PCOS. - Healthcare professionals should consider all of the factors that can impact sexual health in individuals with PCOS including higher weight, hirsutism, mood disorders, infertility, and PCOS medications.	
QoL	- Health care professionals and women should recognize the adverse impact of PCOS and/or PCOS features on the QoL in adults. - Women with PCOS should be asked about their perception of PCOS-related symptoms, impact on QoL, key concerns, and priorities for management. - PCOS-specific QoL screening questionnaires are preferred	

CBT = cognitive behavioral therapy; OCP = oral contraceptive pill; PCOS = polycystic ovary syndrome; QoL; quality of life.

Alur-Gupta. Mental health and PCOS. Fertil Steril 2024.

Given the above evidence, an international evidence-based guideline for the assessment and management of PCOS was published in 2023 (12, 19). This guideline highlights the importance of health care provider awareness of the increased mental health risks associated with PCOS and provides screening and treatment recommendations for these conditions in women with PCOS (Table 3) (12, 19). However, recognition and screening are only the first steps, and unfortunately, the data are less clear on the effectiveness of treatment options for these conditions. Most of the studies on the impact of first-line PCOS treatments evaluate changes in mental health conditions as a secondary, rather than a primary, outcome, which limits generalizability. In addition, most studies only have two time points—preintervention and postintervention—without an evaluation on whether any identified improvements persist over a longer follow-up. Despite these limitations, none of these treatments seem to worsen mental health conditions. Thus, focusing on treating patient symptoms, including irregular periods, obesity, unwanted hair growth, and infertility can often serve dual purposes—treating PCOS-specific symptoms and improving many of the underlying psychological conditions. Available data have clearly demonstrated the interconnectedness of these conditions in individuals with PCOS. For example, we know that the features of PCOS can impact body image and psychosexual health, which can in turn compound the issues experienced with depression, anxiety, and QoL. Because health care providers become more aware of the importance of screening for mental health conditions, it will be easier to holistically treat each patient. In addition, treatment of underlying depression or anxiety may help improve adherence to PCOS treatment, which may have a long-term improvement in other comorbidities associated with PCOS, including metabolic risks.

Although PCOS-specific treatments have their important roles, comprehensive treatment of depression, anxiety, EDs, BID, and psychosexual dysfunction, when present, includes the involvement of health care professionals who specialize in the management of these conditions. Such care involves a multidisciplinary approach, with a key focus being on collaboration with mental health care providers who focus on reproductive or health psychology. Ideally, this should occur at the early stages of PCOS diagnosis to aid in the identification and management of concurrent mental health conditions. Evidence-based treatment for each of these focuses

on the balance of CBT and medication as appropriate. Although studies on the impact of these first-line treatments in individuals with PCOS who meet diagnostic criteria for the above conditions, rather than just screening positive on the initial screen, are limited, the data on their utility in the general population are robust.

Management of all comorbidities of PCOS, whether they are psychological, reproductive, or metabolic, requires a multidisciplinary approach. The 2023 International Guidelines represent a call to action for all of us who take care of individuals with PCOS to not forget the importance of screening for mental health conditions in individuals with PCOS so that we can improve patient outcomes.

CRediT AUTHORSHIP CONTRIBUTION STATEMENT

Snigdha Alur-Gupta: Writing – review & editing, Writing – original draft, Resources, Project administration, Methodology, Investigation, Data curation. **Anuja Dokras:** Writing – review & editing, Supervision, Project administration, Conceptualization. **Laura G. Cooney:** Writing – review & editing, Writing – original draft, Resources, Project administration, Methodology, Investigation, Data curation.

Declaration of interests: S.A-G. has nothing to disclose. A.D. has nothing to disclose. L.G.C. has nothing to disclose.

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