Prevalence and Risk Factors of Sexual Dysfunction in Men and Women

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Sexual dysfunctions are highly prevalent, affecting about 43% of women and 31% of men. Hypoactive sexual desire disorder has been reported in approximately 30% of women and 15% of men in population-based studies, and is associated with a wide variety of medical and psychologic causes. Sexual arousal disorders, including erectile dysfunction in men and female sexual arousal disorder in women, are found in 10% to 20% of men and women, and is strongly age-related in men. Orgasmic disorder is relatively common in women, affecting about 10% to 15% in community-based studies. In contrast, premature ejaculation is the most common sexual complaint of men, with a reporting rate of approximately 30% in most studies. Finally, sexual pain disorders have been reported in 10% to 15% of women and less than 5% of men. In addition to their widespread prevalence, sexual dysfunctions have been found to impact significantly on interpersonal functioning and overall quality of life in both men and women.

Definitions and Outcomes

Sexual dysfunction is highly prevalent in men and women, although estimates vary depending upon the definitions and means of assessment used. From a psychiatric perspective, most definitions are based upon the four-phase model of Masters and Johnson [1], and Kaplan [2]. The first phase, *sexual desire*, consists of the motivational or appetitive aspects of sexual response. Sexual urges, fantasies, and wishes are included in this phase. The second phase, *sexual excitement*, refers to a subjective feeling of sexual pleasure and accompanying physiologic changes. This phase includes penile erection in men and vaginal lubrication in women. The third phase, *orgasm* or *climax*, is defined as the peak of sexual pleasure, with rhythmic contractions of the genital musculature in both men and women, and ejaculation in men. The final phase is *resolution*, during which a general sense of relaxation and well-being is experienced. In men, a refractory period for erection and ejaculation usually occurs during this phase. Sexual dysfunctions can be considered an alteration in one or more phases of the sexual response cycle, and this four-stage model forms the basis for classification of the sexual dysfunctions in the fourth edition of the *Diagnostic and Statistical Manual of Mental Disorders* (DSM-IV) [3].

Based upon this model, four major categories of sexual dysfunction are identified by DSM-IV as follows (Table 1): 1) sexual desire disorders, including hypoactive sexual desire disorder (HSDD) and sexual aversion disorder; 2) sexual arousal disorders, including female sexual arousal disorder (FSAD) and male erectile disorder, or erectile dysfunction (ED); 3) orgasmic disorders, including female orgasmic disorder, male orgasmic disorder, and premature ejaculation (PE); and 4) sexual pain disorders, including dyspareunia and vaginismus. Additional categories include sexual dysfunction due to a general medical condition, substance-induced sexual dysfunction, and sexual dysfunction not otherwise specified. Examples of the latter category include a lack of subjective erotic feelings, despite presence of normal arousal and orgasm, or the presence of a sexual dysfunction of undetermined origin. A revised and expanded classification for female sexual dysfunction recently has been proposed [4••], which incorporates dysfunctions due to organic and psychogenic etiologies. The definitions of desire and arousal difficulties in women have been broadened, and a new category of nongenital sexual pain disorders has been proposed.

Sexual dysfunctions impact significantly on mood, self-esteem, interpersonal functioning, and overall life satisfaction [5,6]. In the Massachusetts Male Aging Study (MMAS) [7], a large-scale epidemiologic study of ED in middle-aged and older males, a strong correlation was observed between the occurrence of erectile difficulties and self-ratings of depression. Men with partial or complete ED rated themselves as significantly more depressed than those with normal erectile function. Moreover, the association between depression and ED was found to be independent of age, health status, or other mediating factors. Similarly, in the National Health and Social Life Survey (NHSLS), a population-based survey of sexual behavior in men and women aged 18 to 59 [5], arousal and desire difficulties in both men and women were strongly associated with decreased physical and emotional satisfaction with the partner relationship. More than two thirds of

Table 1. Sexual response phases and associated dysfunctions

Phase	Charactersistics	Dysfunctions
Desire	First phase of sexual response Characterized by subjective feelings of sexual interest, sexual urges, or fantasies; there are no identifiable physiologic correlates	Hypoactive sexual desire disorder and sexual aversion disorder
Excitement	Second phase of sexual response Includes both subjective and physiologic concomitants of sexual arousal; physiologic changes include penile erection in men, and vaginal engorgement and lubrication in women	Female sexual arousal disorder and male erectile disorder
Orgasm	Third phase of sexual response Includes climax or peaking of sexual tension, rhythmic contractions of the genital musculature, and intense subjective involvement	Female orgasmic disorder, male orgasmic disorder, and premature ejaculation
Resolution	Final phase of sexual response Includes a physical release of tension and subjective sense of well-being; most men have a refractory period for further sexual stimulation	Sexual pain disorders, dyspareunia, and vaginismus

women with sexual arousal or desire difficulties in this study rated themselves as low in overall life satisfaction.

Hypoactive Sexual Desire Disorder

Hypoactive sexual desire disorder was first recognized as an independent clinical entity by Lief [8] and Kaplan [9]. Based on clinical observations that many individuals presenting with sexual dysfunction could not be adequately diagnosed according to the original model of Masters and Johnson [1], a new category of *inhibited sexual desire* was proposed. Lief [8] suggested that this diagnosis be applied specifically to those individuals who chronically fail to initiate or respond to sexual stimuli. As defined by DSM-IV, hypoactive sexual desire is the persistent lack (or absence) of sexual fantasies or desire for any form of sexual activity. Sexual aversion disorder is a subcategory of HSDD, characterized by a marked aversion to, and avoidance of, all genital contact with a sexual partner. In many instances HSDD is secondary to another sexual dysfunction, such as anorgasmia in women or ED in men. It may also result from a wide variety of medical and psychiatric disorders [10], as well as partner conflicts and loss of attraction [11].

Although prevalence rates have varied widely from one study to another, HSDD is generally viewed as a highly prevalent sexual disorder in both men and women. In the population-based NHSLS study [5], 33.4% of women and 15.8% of men between the ages of 18 and 59 had persistent complaints of low sexual desire (Fig. 1). Even higher rates were observed in this study for black women (44%), and those with the lowest level of education (42%). Health difficulties and the lack of a steady partner were strong predictors in men [12••]. The disorder has been shown to be age-related in both sexes, and is increasingly prevalent in both men and women above the age of 60 [10]. It is also strongly associated with comorbid medical and psychiatric disorders, particularly chronic illnesses and depression. Additionally, loss of libido is a frequent

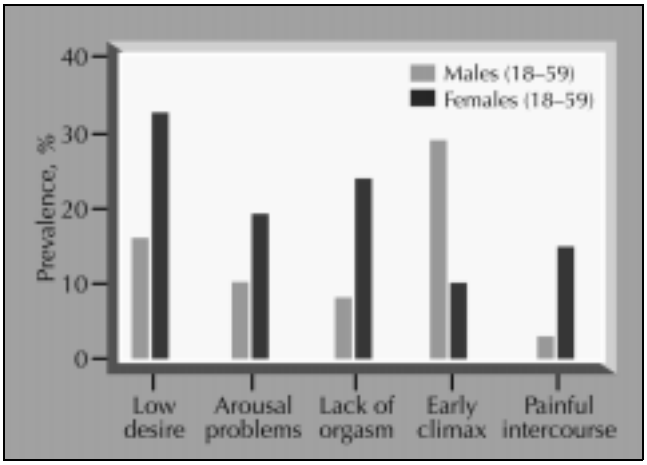

Figure 1. Prevalence of sexual dysfunction, as reported by the National Health and Social Life Survey. (*Adapted from* Laumann *et al.* [5].)

complaint of male and female patients taking antihypertensive or antidepressant medications, particularly selective serotonin reuptake inhibitors (SSRIs) [13••].

Most studies have reported higher rates of HSDD in women compared with men. Among clinic samples, the ratio of female to male cases is typically about 2:1 or 3:1 [14,15]. In one study [15], 37% of female patients in a sexual dysfunction clinic had a primary diagnosis of hypoactive desire, compared with less than 5% of males. However, many male patients with ED have a secondary diagnosis of HSDD in these studies. Female patients with arousal or orgasmic disorders may also have a secondary diagnosis of HSDD. The prevalence of sexual aversion disorder is presently unknown, as none of the studies to date have reported separate prevalence data for this disorder. A history of sexual trauma or abuse is associated frequently with this disorder in the clinical literature [10].

In addition to medical and psychiatric causes, relationship conflict is often cited as a causal factor for HSDD, particularly in women [10,11]. Specific relationship problems identified in these studies include lack of trust

and intimacy, conflicts over power and control, and loss of physical attraction to the partner. In a study of women seeking treatment for low desire compared with age-matched controls, women with HSDD were found to have an increased frequency of premarital sex, poorer marital adjustment, and diminished feelings of emotional closeness with their partners [16]. In a similar study of married men with low desire [17], interpersonal dependency was inversely related to sexual desire levels. Others have found that relationship dissatisfaction is more likely to be reported by female patients with HSDD than by their male counterparts [18].

Overall, sexual desire disorders constitute a highly prevalent and etiologically diverse category of sexual problems in both men and women. Few conceptual models have been proposed and there is a general lack of agreement concerning the criteria for diagnosis or classification. Hormonal, psychologic, and interpersonal factors have all been implicated as causes, although research findings to date have been sparse and contradictory. Inconsistent findings between studies may be due in large part to the lack of standardized definitions or assessment criteria for HSDD. As noted by Bancroft [19], "of the various aspects of human sexual experience, sexual desire remains the most resistant to clinical or conceptual analysis."

Sexual Arousal Disorders

Disorders of sexual arousal are characterized by the inability to achieve sufficient physiologic or subjective arousal during sexual stimulation. In women, the disorder is referred to as *female sexual arousal disorder*; in men, the term *male erectile disorder* (ED) is used. Sexual arousal disorder in women is typically characterized by the inability to achieve an adequate lubrication-swelling response of the vagina and labia for the completion of sexual activity, or a lack of subjective arousal during sexual activity. Although intercourse may be performed by women with female sexual arousal disorder, a lack of adequate lubrication may result in pain or vaginal irritation. In men, ED is characterized by the inability to achieve or maintain erection sufficient for intercourse. Sexual arousal disorders are common in both sexes, although men typically respond with a greater degree of emotional or psychologic distress [6]. Similarly, men are more likely to seek treatment for ED than for any other sexual disorder [20,21•].

Erectile dysfunction is a prevalent sexual complaint in men, and has become the focus of intense public attention in recent years. In the Massachusetts Male Aging Study (MMAS) [7], 52% of respondents over age 50 reported some degree of erectile difficulty. Complete ED, defined as the total inability to obtain or maintain erections during sexual stimulation, as well as the absence of nocturnal erections, occurred in 10% of respondents. Lesser degrees of mild and moderate ED occurred in 17% and 25% of the respondents, respectively (Fig. 2). In the NHSLS survey [5],

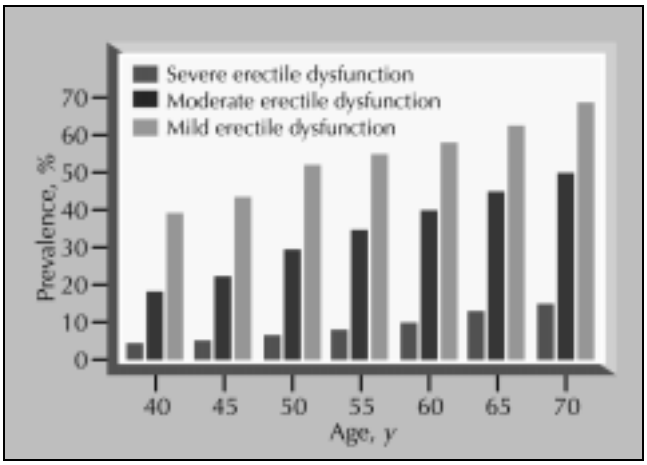

Figure 2. Prevalence of erectile dysfunction. (*Adapted from* Feldman *et al.* [7].)

10.4% of men reported an inability to achieve or maintain an erection during the past year (corresponding to approximately the same proportion of men in the MMAS study [7] reporting complete ED). Both studies observed a strong relationship between erectile difficulties and age. Although the prevalence of mild ED in the MMAS study [7] remained constant (17%) between the ages of 40 and 70, there was a doubling in the number of men reporting moderate ED (17%–34%) and a tripling of complete erectile dysfunction (5%–15%). If the MMAS data [7] are extrapolated, there are an estimated 18 to 30 million American men who are affected by ED.

Erectile dysfunction is related strongly to both physical and psychologic determinants. Among the major predictors of erectile dysfunction observed in the MMAS [7], diabetes mellitus, heart disease, hypertension, and decreased high-density lipoprotein levels were all associated with increased risk for the disorder. Medications for diabetes, hypertension, and cardiovascular disease are other major risk factors. In addition, there is a higher prevalence of ED among men who have undergone radiation or surgery for prostate cancer, or who have a lower spinal cord injury. The psychologic correlates of ED include depression and anger. The NHSLS survey [12••] found a higher rate of erectile difficulties among men who reported poor to fair health, and among men experiencing stress from unemployment or other causes. Despite its increasing prevalence among older men, ED is not considered a normal or inevitable part of the aging process. It is rarely (in fewer than 5% of cases) due to aging-related hypogonadism, although the relationship between ED and age-related declines in the hormone androgen remains controversial. A recent follow-up study of the MMAS [22] showed that increasing age, diabetes, heart disease, and hypertension were the most significant risk factors for new-onset incidence of ED during the 10-year period from 1987 to 1997.

Female sexual arousal disorder is less well characterized than its male counterpart. The prevalence of FSAD varies

greatly depending upon the definition of the disorder and type of sample studied. Many women with excitement-phase disorders also have orgasmic difficulties or hypoactive desire, which may result in a significant underestimate of prevalence in most studies. In one study, 329 women attending an outpatient gynecology clinic were asked detailed questions regarding all phases of the sexual response cycle [23]. Results indicated that 13.6% of women experienced a lack of lubrication during most or all sexual activity and 23.3% had occasional difficulty with lubrication. Among the postmenopsal women in this study, the incidence of lubrication problems increased to 44.2%. Findings from the NHSLS study [5] showed that approximately 20% of women aged 18 to 59 reported difficulty in become lubricated during sexual stimulation. Similar prevalence estimates were recently reported in a large-scale British study [21••], which also found a significant increase in the prevalence of FSAD with aging. Marital difficulties, anxiety, and depression were all found to be significant risk factors for female sexual arousal difficulties in this study.

Orgasmic Disorders

Orgasmic disorders include difficulties with the third phase of the sexual response cycle. Male orgasmic disorder and female orgasmic disorder both refer to persistent or recurrent difficulties in achieving orgasm, despite adequate sexual stimulation. Some individuals are orgasmic with masturbation or sexual foreplay with a partner, but are unable to achieve orgasm during intercourse. These problems are sometimes referred to as situational or secondary orgasmic dysfunction [1]. Other individuals are unable to achieve orgasm through any means of stimulation. This disorder is referred to as primary orgasmic dysfunction or anorgasmia, and is more prevalent in women. In men, the occurrence of rapid and uncontrolled ejaculation is referred to as premature ejaculation (PE). Despite the frequency and clinical significance of this condition in men, there is no corresponding diagnosis in women.

Female orgasmic dysfunction is a highly prevalent sexual dysfunction in women. Among sex therapy clinic samples, the rate of anorgasmia in women has ranged from 24% [20] to 37% [14]. Similarly high rates have been reported in population-based survey studies [5,21••,23]. In the latter study [23] 15.4% of premenopausal women and 34.7% of postmenopausal women reported usually or always having difficulty in achieving orgasm during sexual stimulation (Fig. 3). Interestingly, the incidence of anorgasmia in the general population appears to be significantly higher in single women, compared with married or cohabiting women [12••]. Orgasmic ability in women has been associated with sexual assertiveness [24] and experience with masturbation [25]. In contrast, no relationship has been observed between anorgasmia and race, socioeconomic status, and educational or religious background [12••,26].

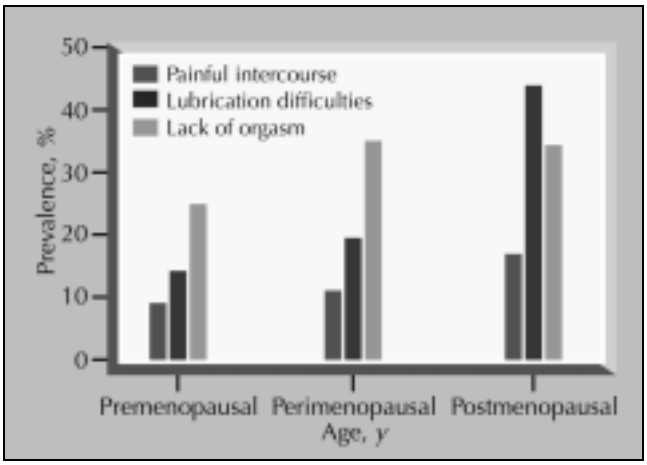

Figure 3. Relationship between sexual dysfunction and menopause. (*Adapted from* Rosen *et al.* [23].)

Relationship and psychologic distress factors have been associated with secondary orgasmic dysfunction in women in several studies. In one study [27], women with secondary orgasmic disorder were shown to be satisfied less with their marital relationships, and reported more rigid and constrained masturbatory practices when compared with women with lifelong orgasmic disorder. Other researchers have reported that women with situational or acquired orgasmic dysfunction are more likely to have co-occurring psychiatric disorders than women with generalized or lifelong orgasmic difficulties [28]. These findings are consistent with treatment studies that indicate poorer outcome for the treatment of secondary orgasmic dysfunction compared with treatment of primary orgasmic dysfunction in women [26,29]. Relationship conflicts were also found to be associated significantly with the occurrence of orgasmic difficulties in women in a recent British study [21••].

Male orgasmic disorder, or delayed ejaculation, is defined as a "persistent or recurrent delay in, or absence of, orgasm following a normal sexual excitement phase" [3]. The disorder is relatively rare in men, occurring in approximately 3% to 8% of clinic samples [14,20]. A higher prevalence rate (10%–15%) has been reported among homosexual males [30]. Delayed or absent ejaculation may be associated with a variety of medical or surgical conditions (*eg*, multiple sclerosis, spinal cord injury, surgical prostatectomy), or the use of anti-adrenergic or neuroleptic medications [31,32]. Psychologic and interpersonal factors have been implicated in the development of the disorder, including performance anxiety, conditioning factors, fear of impregnation, and lack of desire or arousal [33].

Delayed or absent orgasm is a frequent complaint of both men and women receiving antidepressant medications, particularly SSRIs [13••,32]. In some studies, 20% to 50% of patients taking SSRIs have experienced orgasmic difficulties, related to both the type of drug and dosage being used. Several mechanisms have been proposed, including the potency of serotonin uptake

blockade, drug accumulation effects, elevated prolactin levels, anticholinergic effects and potential inhibition of nitric oxide synthetase [13••]. Inhibitory effects of SSRIs on male orgasm have been used as the basis for treatment of PE in several studies.

Premature ejaculation is the most frequent sexual complaint in men. Prevalence data from nonclinical samples indicate that approximately 25% to 40% of adult males in the general population have complaints of rapid or premature ejaculation [5,21••]. In an early study of 100 "happily married couples" [34], it was reported that 36% of males have difficulty in controlling ejaculation or ejaculating too rapidly on most occasions. Similar findings were reported in the NHSLS [5]. Other surveys have reported that as many as 60% of males may have intermittent problems with rapid ejaculation [35]. Although there is some evidence of a decline in the number of cases of PE presenting for sexual dysfunction treatment [36], it continues to be a highly prevalent and potentially disruptive disorder for many men.

A major difficulty in the past has been the lack of clearcut definitions or diagnostic criteria for early ejaculation. Masters and Johnson [1] initially defined the disorder in terms of the male's inability to delay ejaculation until his partner had been sexually satisfied on at least 50% of intercourse attempts. Other authors have emphasized the average duration of intercourse or number of thrusts following penetration. A third approach has been to emphasize the degree of voluntary control that the male has over ejaculation [2]. The definition of PE offered in DSM-IV is intended to incorporate the elements of each of these earlier definitions. According to DSM-IV, PE is defined as "persistent or recurrent ejaculation with minimal sexual stimulation or before, upon, or shortly after penetration and before the person wishes it" [3]. In making the diagnosis, clinicians are expected to take into account contextual and historic factors, such as the patient's age, the novelty or intensity of sexual stimulation, and the time since last sexual activity. In the absence of adequate norms, these considerations are likely to be highly subjective.

Few clearcut risk factors or antecedents have been identified for PE. In the NHSLS [12••], emotional stress factors and a history of urinary tract symptoms were modestly associated with the prevalence of PE. Findings from the recent British study [21••] suggest that sexual anxiety may be an important predisposing factor for some men. Aging was not a significant risk factor for PE in the NHSLS study, in contrast to the findings reported above for erectile dysfunction and hypoactive desire. Approximately 25% to 30% of men at each age level reported recurrent difficulties in the control of ejaculation [5]. In this study, premature ejaculation was also less likely to be associated with depression and other quality-of-life factors than erectile difficulties or low sexual desire. Finally, men with PE are less likely to seek professional help for the problem than men with ED.

Sexual Pain Disorders

Dyspareunia, or pain associated with sexual intercourse, is highly prevalent in women, but relatively rare in men [5,21••,36]. According to DSM-IV criteria, the pain may occur before or after intercourse in order for the diagnosis to be made [3]. In many cases, pain may result from a lack of lubrication [37]; however, DSM-IV requires that the pain not be solely due to a lack of lubrication for dyspareunia to be diagnosed. Difficulty in assessing adequate lubrication and the expected co-occurrence of arousal problems with sex-related pain in women limit the usefulness of this distinction [38,39]. Based upon the recently revised classification for female sexual dysfunction [4••], a new category of *noncoital sexual pain disorder* has been added. This refers to persistent or recurrent genital pain induced by noncoital sexual stimulation (*eg*, masturbation or manual stimulation). The prevalence of this new category is unknown.

According to the NHSLS, 14.4% of women and 3.0% of men have experienced pain during sexual activity during the past year [5]. In this study, dyspareunia in women was found to be inversely related to age and minority status. In a similar population-based study of French women aged 18 to 69 [40], 5% of respondents reported frequent pain, and 19% had occasional pain during intercourse. In postmenopsal women, the prevalence of dyspareunia may be even higher. According to one study, 34% of postmenopsal women reported pain during sexual activity either “sometimes” or “often” [23]. It is unclear whether the increase in dyspareunia observed in postmenopsal samples is related to difficulties with lubrication or loss of elasticity in the vaginal lining, or to the effects of nonspecific factors such as reduced androgen levels and associated loss of sexual desire.

A wide variety of medical or organic conditions have been associated with dyspareunia in women, including hymenal scarring, pelvic inflammatory disease, and vulvar vestibulitis [37,38]. In men, Peyronie's disease (*ie,* an extreme bend in the penis), painful retraction of the foreskin (phimosis), and physical trauma to the genitalia have been associated with painful intercourse in a few cases [19]. Despite these clinical reports, dyspareunia is not reliably associated with any particular medical disorder. Moreover, anatomic or physiologic factors that may have caused the original pain may not be the same factors responsible for maintaining it. Accordingly, some authors have recommended an interactive or multidimensional model of physical and psychologic determinants of dyspareunia [38].

Vaginismus, or involuntary spasms of the musculature of the outer third of the vagina, is a significant cause of penetration difficulties in women. The disorder is seen relatively frequently in sex-therapy clinics, occurring in approximately 15% to 17% of women presenting for treatment [36]. The validity of the diagnostic distinction between vaginismus and dyspareunia has recently been

challenged, because 1) it is difficult in most cases to assess whether it is the pain itself, or vaginal contractions that prevent penetration; 2) all pain (including dyspareunic pain) can be accompanied by muscular contractions; and 3) the definition of what constitutes involuntary contractions is highly uncertain [38].

According to DSM-IV, a distinction is drawn between generalized vaginismus, which refers to involuntary vaginal spasms in all situations, and situational vaginismus, in which some penetration is possible (*eg,* insertion of a tampon). Women with generalized vaginismus typically avoid gynecologic examinations and tampon use, in addition to sexual intercourse. Vaginismus can occur in association with vaginal pain due to various medical conditions, although it is more frequently related to psychological or interpersonal factors [36].

In summary, sexual pain disorders are relatively common in women but occur infrequently in men. Dyspareunia is the only female sexual dysfunction in which organic factors have been shown to play a major role, and there is a need for integration of medical and psychologic formulations. Vaginismus, on the other hand, is most often associated with psychologic and interpersonal determinants. Both disorders are typically associated with avoidance of sexual contact and marked interpersonal distress.

Conclusions

Sexual problems are highly prevalent in both men and women, and often affect interpersonal functioning and quality of life. In women, the most frequent complaints are low sexual desire and orgasmic difficulties. A significant percentage of women also experience difficulties with sexual arousal or have pain during sexual stimulation (dyspareunia). This latter condition can be especially debilitating for postmenopsal women. In contrast, the most common sexual problem in men is PE, followed by ED and hypoactive sexual desire. A smaller percentage of men report problems with anorgasmia or pain during sexual intercourse. Sexual problems are associated with a wide range of biomedical and psychosocial risk factors, although organic cses are more commonly associated with some problems (*eg,* ED, dyspareunia) than with others (*eg,* hypoactive sexual desire, PE). Further research is needed on the prevalence and cses of sexual dysfunction in both men and women.

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