

Sexual Dysfunction in the United States

Prevalence and Predictors

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SEXUAL DYSFUNCTIONS ARE CHARACTERIZED by disturbances in sexual desire and in the psychophysiological changes associated with the sexual response cycle in men and women.¹ Despite increasing demand for clinical services and the potential impact of these disorders on interpersonal relationships and quality of life,^{2,3} epidemiologic data are relatively scant. Based on the few available community studies, it appears that sexual dysfunctions are highly prevalent in both sexes, ranging from 10% to 52% of men and 25% to 63% of women.⁴⁻⁶ Data from the Massachusetts Male Aging Study⁷ (MMAS) showed that 34.8% of men aged 40 to 70 years had moderate to complete erectile dysfunction, which was strongly related to age, health status, and emotional function. Erectile dysfunction has been described as an important public health problem by a National Institutes of Health Consensus Panel,⁸ which identified an urgent need for population-based data concerning the prevalence, determinants, and consequences of this disorder. Even less is known about the epidemiology of female sexual dysfunction.

Professional and public interest in sexual dysfunction has recently been sparked by developments in several areas. First, major advances have occurred in our understanding of the neurovascular mechanisms of sexual response in men and women.⁹⁻¹¹ Several new classes of drugs have been identified that offer significant therapeutic po-

Context While recent pharmacological advances have generated increased public interest and demand for clinical services regarding erectile dysfunction, epidemiologic data on sexual dysfunction are relatively scant for both women and men.

Objective To assess the prevalence and risk of experiencing sexual dysfunction across various social groups and examine the determinants and health consequences of these disorders.

Design Analysis of data from the National Health and Social Life Survey, a probability sample study of sexual behavior in a demographically representative, 1992 cohort of US adults.

Participants A national probability sample of 1749 women and 1410 men aged 18 to 59 years at the time of the survey.

Main Outcome Measures Risk of experiencing sexual dysfunction as well as negative concomitant outcomes.

Results Sexual dysfunction is more prevalent for women (43%) than men (31%) and is associated with various demographic characteristics, including age and educational attainment. Women of different racial groups demonstrate different patterns of sexual dysfunction. Differences among men are not as marked but generally consistent with women. Experience of sexual dysfunction is more likely among women and men with poor physical and emotional health. Moreover, sexual dysfunction is highly associated with negative experiences in sexual relationships and overall well-being.

Conclusions The results indicate that sexual dysfunction is an important public health concern, and emotional problems likely contribute to the experience of these problems.

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tential for the treatment of male erectile disorder,¹²⁻¹⁴ while other agents have been proposed for sexual desire and orgasm disorders.^{15,16} Availability of these drugs could increase dramatically the number of patients seeking professional help for these problems. Epidemiologic data would be of obvious value in developing appropriate service delivery and resource allocation models. Additionally, changing cultural attitudes and demographic shifts in the population have highlighted the pervasiveness of sexual concerns in all ethnic and age groups.

The present study addresses these issues by analyzing data on sexual dysfunction from the National Health and Social Life Survey (NHSLs), a study of adult sexual behavior in the United States.¹⁷ Sampling, data collection, and response analysis were all conducted under highly

controlled conditions. This unique data source provides extensive information on key aspects of sexual behavior, including sexual problems and dysfunction, health and lifestyle variables, and socio-cultural predictors. Prior analyses of sexual dysfunction, using NHSLs data, are lim-

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ited, presenting basic prevalence rates across demographic characteristics and indicators of overall health and well-being.^{17(pp368-374)} The present study, in contrast, uses multivariate techniques to estimate relative risk (RR) of sexual dysfunction for each demographic characteristic as well as for key risk factors.

METHODS

Survey

The NHLSL, conducted in 1992, is a national probability sample of 1410 men and 1749 women between the ages of 18 and 59 years living in households throughout the United States. It accounts for about 97% of the population in this age range—roughly 150 million Americans. It excludes people living in group quarters such as barracks, college dormitories, and prisons, as well as those who do not know English well enough to be interviewed. The sample completion rate was greater than 79%. Checks with other high-quality samples (eg, US Census Bureau's Current Population

Survey) indicated that the NHLSL succeeded in producing a truly representative sample of the population. Each respondent was surveyed in person by experienced interviewers, who matched respondents on various social attributes, for an interview averaging 90 minutes. Extensive discussion of the sampling design and evaluations of sample and data quality are found in the book by Laumann et al.^{17(pp35-73,549-605)}

Sexual dysfunction was indexed in this study according to 7 dichotomous response items, each measuring presence of a critical symptom or problem during the past 12 months.^{17(pp660)} Response items included: (1) lacking desire for sex; (2) arousal difficulties (ie, erection problems in men, lubrication difficulties in women); (3) inability achieving climax or ejaculation; (4) anxiety about sexual performance; (5) climaxing or ejaculating too rapidly; (6) physical pain during intercourse; and (7) not finding sex pleasurable. The last 3 items were asked only of respondents who were sexually active dur-

ing the prior 12-month period. Taken together, these items cover the major problem areas addressed in the *Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition*¹ classification of sexual dysfunction. Self-reports about sexual dysfunctions, especially in face-to-face interviews, are subject to underreporting biases arising from personal concerns about social stigmatization. Moreover, there may be systematic biases in underreporting related to particular attributes of the respondents. For example, older or less educated women or younger Hispanic men might be more reluctant to report sexual problems. Lack of privacy during interviews could also result in underreporting. However, analyses (not reported herein) indicate that reporting biases due to lack of privacy are negligible in NHLSL data.^{17(pp564-570)}

A latent class analysis (LCA) was used to evaluate the syndromal clustering of individual sexual symptoms. Latent class analysis is a statistical method well suited

Table 1. Prevalence of Dysfunction Items by Demographic Characteristics (Women)*

Predictors	Lacked Interest in Sex		Unable to Achieve Orgasm		Experienced Pain During Sex	
	No. (%)	Adjusted OR (95% CI)	No. (%)	Adjusted OR (95% CI)	No. (%)	Adjusted OR (95% CI)
Total	1486		1477		1479	
Age, y						
18-29	154 (32)	Referent	125 (26)	Referent	99 (21)	Referent
30-39	161 (32)	1.05 (0.78-1.41)	140 (28)	1.25 (0.91-1.72)	73 (15)	0.63 (0.44-0.91)†
40-49	101 (30)	1.02 (0.73-1.44)	72 (22)	0.91 (0.63-1.32)	42 (13)	0.55 (0.36-0.85)†
50-59	53 (27)	0.78 (0.52-1.18)	43 (23)	0.92 (0.60-1.44)	16 (8)	0.31 (0.17-0.56)†
Marital status						
Currently married	264 (29)	Referent	199 (22)	Referent	132 (14)	Referent
Never married	108 (35)	1.15 (0.83-1.59)	92 (30)	1.45 (1.03-2.05)†	53 (17)	0.85 (0.56-1.27)
Divorced, separated, or widowed	91 (34)	1.25 (0.93-1.69)	85 (32)	1.68 (1.23-2.29)†	43 (16)	1.14 (0.77-1.68)
Education						
Less than high school	85 (42)	Referent	67 (34)	Referent	36 (18)	Referent
High school graduate	149 (33)	0.70 (0.49-1.00)†	129 (29)	0.79 (0.55-1.15)	77 (17)	0.95 (0.61-1.51)
Some college	153 (30)	0.63 (0.44-0.90)†	122 (24)	0.62 (0.42-0.90)†	81 (16)	0.85 (0.54-1.34)
College graduate	80 (24)	0.52 (0.34-0.78)†	59 (18)	0.47 (0.30-0.73)†	34 (10)	0.55 (0.32-0.95)†
Race or ethnicity						
White	324 (29)	Referent	275 (24)	Referent	178 (16)	Referent
Black	90 (44)	1.67 (1.16-2.40)†	64 (32)	1.12 (0.76-1.65)	27 (13)	0.61 (0.37-1.02)‡
Hispanic	35 (30)	0.90 (0.57-1.40)	25 (22)	0.69 (0.42-1.13)	16 (14)	0.64 (0.36-1.15)
Other	20 (42)	1.62 (0.86-3.05)	16 (34)	1.41 (0.72-2.78)	9 (19)	0.83 (0.36-1.95)

*Data are from National Health and Social Life Survey.¹⁷ Estimated ratio of odds of reporting a given symptom for members of the specified group to odds for reference group. Derived from logistic regression models performed on respondents with at least 1 partner during the 12-month period prior to the survey. The model includes all predictor variables as well as controls for religious affiliation and residence in rural, suburban, or urban areas. Percentages are derived from respondents in each category, and the total number represents those who responded to the questions. OR indicates odds ratio; CI, confidence interval.

† $P \leq .05$.

‡ $P \leq .10$.

for grouping categorical data into latent classes^{18,19} and has a number of medical applications, such as evaluation of diagnostic systems²⁰⁻²³ and generation of epidemiologic estimates using symptom data.^{24,25} Latent class analysis tests whether a latent variable, specified as a set of mutually exclusive classes, accounts for observed covariation among manifest, categorical variables. A more detailed discussion of this method is available on request from the authors. Since diagnostic criteria for disorders of sexual dysfunction involve a complex of symptoms, we used LCA for grouping symptoms into categories. These categories, then, represent a typology of disorders for sexual dysfunction found in the US population, indicating both prevalence and types of symptoms.

We analyzed only those respondents reporting at least 1 partner in the prior 12-month period. Respondents who were sexually inactive during this period were excluded. This procedure may limit our results because excluded respondents

may have avoided sex because of sexual problems. However, this procedure was necessary to ensure that each respondent answered all the symptom items since 3 items were asked only of sexually active respondents. A total of 139 men and 238 women were excluded on this basis. Excluded men were more likely to be single and have lower levels of education. We expect that this will bias our estimates of prevalence of sexual dysfunction downward since sexually inactive men generally reported higher rates of symptoms. Excluded women tended to be older and single. The exclusion of these women is likely to bias our estimates of the prevalence of sexual dysfunction upward given that these women tended to report lower rates.

Analyses performed in this study were made by use of logistic and multinomial logistic regression. For assessing the prevalence of symptoms across demographic characteristics, we performed logistic regressions for each symptom. This approach produced adjusted odds ratios

(ORs), which indicate the odds that members of a given social group (eg, never married) reported the symptom relative to a reference group (eg, currently married), while controlling for other demographic characteristics. Demographic characteristics included respondent's age, marital status, educational attainment level, and race and ethnicity. Next, while controlling for these characteristics, we estimated adjusted ORs using multinomial logistic regressions for 3 sets of risk factors, each modeled separately in a nonnested manner. Risk factors associated with health and lifestyle included alcohol consumption, prior contraction of sexually transmitted diseases (STDs), presence of urinary tract symptoms, circumcision, health status, and experience of emotional or stress-related problems. Social status variables included change in income level and normative orientation, indexed by how liberal or conservative respondents' attitudes were toward sex. Risk factors associated with sexual experience included the number of lifetime sex partners, frequency of sex, how often respondents think about sex, frequency of masturbation, same sex contact, and experience in potentially traumatic events such as adult-child contact, forced sexual contact, sexual harassment, and abortion. Finally, we conducted a set of logistic regressions that used the categories of sexual dysfunction as predictor variables. These models measured the association between experience of dysfunction categories and quality-of-life concomitants, which included being satisfied personally and in relationships. We stress that concomitant outcomes cannot be causally linked as an outcome of sexual dysfunction. Latent class analyses were performed using maximum likelihood latent structure analysis.²⁶ All logistic regressions used STATA version 5.0.²⁷ Information regarding variable construction, LCA methods, and data quality are available from the authors.

RESULTS

Prevalence of Sexual Problems

Use of NHLS data allows for calculating national prevalence estimates of sexual problems for adult women and

Sex Not Pleasurable		Anxious About Performance		Trouble Lubricating	
No. (%)	Adjusted OR (95% CI)	No. (%)	Adjusted OR (95% CI)	No. (%)	Adjusted OR (95% CI)
1479		1482		1475	
129 (27)	Referent	78 (16)	Referent	92 (19)	Referent
118 (24)	0.80 (0.58-1.11)	57 (11)	0.71 (0.47-1.08)	91 (18)	0.84 (0.59-1.20)
55 (17)	0.52 (0.35-0.77)†	36 (11)	0.73 (0.46-1.18)	69 (21)	0.97 (0.66-1.44)
33 (17)	0.53 (0.33-0.84)†	12 (6)	0.40 (0.20-0.79)†	52 (27)	1.40 (0.91-2.15)
188 (21)	Referent	86 (9)	Referent	196 (22)	Referent
79 (25)	0.92 (0.65-1.31)	55 (18)	1.57 (1.02-2.42)†	54 (17)	0.82 (0.56-1.21)
66 (25)	1.24 (0.89-1.74)	39 (15)	1.59 (1.05-2.41)†	51 (19)	0.93 (0.66-1.33)
57 (28)	Referent	37 (18)	Referent	31 (15)	Referent
102 (23)	0.81 (0.55-1.20)	54 (12)	0.66 (0.41-1.06)‡	91 (20)	1.28 (0.81-2.02)
115 (23)	0.78 (0.52-1.15)	59 (12)	0.57 (0.35-0.92)†	108 (21)	1.45 (0.92-2.30)
59 (18)	0.67 (0.43-1.06)‡	32 (10)	0.56 (0.32-0.98)†	72 (22)	1.49 (0.91-2.45)
235 (21)	Referent	125 (11)	Referent	253 (22)	Referent
66 (32)	1.42 (0.96-2.11)‡	33 (16)	1.18 (0.71-1.95)	30 (15)	0.63 (0.40-1.02)‡
23 (20)	0.72 (0.43-1.21)	14 (12)	0.86 (0.45-1.65)	13 (12)	0.51 (0.27-0.94)†
11 (23)	0.77 (0.36-1.65)	11 (23)	1.68 (0.76-3.72)	8 (17)	0.57 (0.24-1.38)

men. While NHLS data on critical symptoms do not connote a clinical definition of sexual dysfunction, their prevalence does provide important information about their extent and differential distribution among the US population. **TABLE 1** and **TABLE 2** analyze the prevalence of sexual problems across selected demographic characteristics. For women, the prevalence of sexual problems tends to decrease with increasing age except for those who report trouble lubricating. Increasing age for men is positively associated with experience of erection problems and lacking desire for sex. The oldest cohort of men (ages 50-59 years) is more than 3 times as likely to experience erection problems (95% confidence interval [CI], 1.8-7.0) and to report low sexual desire (95% CI, 1.6-5.4) in comparison to men aged 18 to 29 years. The prevalence of sexual problems also varies significantly across marital status. Premarital and postmarital (divorced, widowed, or separated) statuses

are associated with elevated risk of experiencing sexual problems. Nonmarried women are roughly 1½ times more likely to have climax problems (95% CI, 1.0-2.1 and 1.2-2.3, respectively) and sexual anxiety (95% CI, 1.0-2.4 and 1.1-2.4, respectively) than married women. Similarly, nonmarried men report significantly higher rates for most symptoms of sexual dysfunction than married men. Thus, married women and men are clearly at lower risk of experiencing sexual symptoms than their nonmarried counterparts.

High educational attainment is negatively associated with experience of sexual problems for both sexes. These differences are especially marked between women who do not have high school diplomas and those who have college degrees. Controlling for other demographic characteristics, women who have graduated from college are roughly half as likely to experience low sexual desire (95% CI, 0.3-0.8), problems achieving

orgasm (95% CI, 0.3-0.7), sexual pain (95% CI, 0.3-1.0), and sexual anxiety (95% CI, 0.3-1.0) as women who have not graduated from high school. Male college graduates are only two thirds (95% CI, 0.4-1.0) as likely to report climaxing too early and half as likely to report nonpleasurable sex (95% CI, 0.2-0.9) and sexual anxiety (95% CI, 0.3-0.8) than men who do not have high school diplomas. Overall, women and men with lower educational attainment report less pleasurable sexual experience and raised levels of sexual anxiety.

The association between race and ethnicity and sexual problems is more variable. Black women tend to have higher rates of low sexual desire and experience less pleasure compared with white women, who are more likely to have sexual pain than black women. Hispanic women, in contrast, consistently report lower rates of sexual problems. Differences between men are not as marked but are generally consistent with

Table 2. Prevalence of Dysfunction Items by Demographic Characteristics (Men)*

Predictors	Lacked Interest in Sex		Unable to Achieve Orgasm		Climax Too Early	
	No. (%)	Adjusted OR (95% CI)	No. (%)	Adjusted OR (95% CI)	No. (%)	Adjusted OR (95% CI)
Total	1249		1246		1243	
Age, y						
18-29	56 (14)	Referent	28 (7)	Referent	121 (30)	Referent
30-39	52 (13)	1.52 (0.95-2.42)‡	28 (7)	1.31 (0.71-2.40)	122 (32)	1.01 (0.72-1.42)
40-49	45 (15)	2.11 (1.23-3.64)†	26 (9)	1.79 (0.90-3.55)‡	83 (28)	0.88 (0.60-1.30)
50-59	30 (17)	2.95 (1.60-5.44)†	15 (9)	1.74 (0.79-3.83)	55 (31)	0.95 (0.61-1.49)
Marital status						
Currently married	77 (11)	Referent	49 (7)	Referent	214 (30)	Referent
Never married	71 (19)	2.75 (1.74-4.36)†	31 (8)	1.55 (0.86-2.79)	111 (29)	0.95 (0.68-1.33)
Divorced, separated, or widowed	31 (18)	1.69 (1.05-2.73)†	15 (9)	1.29 (0.69-2.39)	54 (32)	1.12 (0.77-1.62)
Education						
Less than high school	30 (19)	Referent	18 (11)	Referent	61 (38)	Referent
High school graduate	42 (12)	0.61 (0.35-1.05)‡	25 (7)	0.62 (0.31-1.21)	125 (35)	0.91 (0.61-1.35)
Some college	65 (16)	0.88 (0.53-1.47)	32 (8)	0.68 (0.35-1.30)	106 (26)	0.58 (0.39-0.87)†
College graduate	44 (14)	0.71 (0.40-1.24)	22 (7)	0.55 (0.27-1.12)‡	87 (27)	0.65 (0.42-1.00)†
Race or ethnicity						
White	134 (14)	Referent	68 (7)	Referent	290 (29)	Referent
Black	27 (19)	1.13 (0.67-1.90)	13 (9)	1.14 (0.57-2.26)	49 (34)	1.14 (0.75-1.72)
Hispanic	12 (13)	0.94 (0.47-1.86)	8 (9)	1.24 (0.54-2.83)	25 (27)	0.78 (0.46-1.31)
Other	10 (24)	2.02 (0.94-4.32)‡	8 (19)	2.83 (1.24-6.50)†	17 (40)	1.63 (0.86-3.09)

*Data are from National Health and Social Life Survey.¹⁷ Estimated ratio of odds of reporting a given symptom for members of the specified group to odds for reference group. Derived from logistic regression models performed on respondents with at least 1 partner during the 12-month period prior to the survey. The model includes all predictor variables as well as controls for religious affiliation and residence in rural, suburban, or urban areas. Percentages are derived from respondents in each category, and the total number represents those who responded to the questions. OR indicates odds ratio; CI, confidence interval.

† $P \leq .05$.

‡ $P \leq .10$.

what women experience. Indeed, although the effects of race and ethnicity are fairly modest among both sexes, blacks appear more likely to have sexual problems while Hispanics are less likely to have sexual problems, across the categories of sexual dysfunction.

Latent Class Analysis

The results of LCA allow for analyzing risk factors and quality-of-life concomitants in relation to categories of sexual dysfunction, rather than individual symptoms. Analyses presented in TABLE 3, TABLE 4, and TABLE 5 use the results of LCA instead of individual symptoms. These results indicate that the clustering of symptoms according to syndrome can be represented by 4 categories for women as well as for men. Latent class analysis also estimates the size of each class as a proportion of the total sample, a result corresponding to prevalence of categories of sexual dysfunction in the US population. Finally, LCA identifies each class's symp-

tom, indicating the likelihood that respondents in that class will exhibit a given symptom, thus providing researchers with information about what elements characterize each category. Although not equivalent to clinical diagnosis, this approach offers a statistical representation of sexual dysfunction.

For women, the 4 categories identified by LCA roughly correspond to major disorders of sexual dysfunction as outlined by the *Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition*.¹ These include an unaffected group (58% prevalence), a low sexual desire category (22% prevalence), a category for arousal problems (14% prevalence), and a group with sexual pain (7% prevalence). Similarly, a large proportion of men (70% prevalence) constitutes an unaffected population. The remaining categories consist of premature ejaculation (21% prevalence), erectile dysfunction (5% prevalence), and low sexual desire (5% prevalence). Overall, the results

of LCA show that the total prevalence of sexual dysfunction is higher for women than men (43% vs 31%).

Risk Factors

Tables 3 and 4 present multinomial logistic regressions on categories of sexual dysfunction. Adjusted ORs indicate the relative risk of experiencing a given category of sexual dysfunction vs reporting no problems for each risk factor, while controlling for other characteristics. With regard to health and lifestyle risk factors, those who experience emotional or stress-related problems are more likely to experience sexual dysfunctions defined in each of the categories. In contrast, health problems affect women and men differently. Men with poor health have elevated risk for all categories of sexual dysfunction, whereas this factor is only associated with sexual pain for women. The presence of urinary tract symptoms appears to impact sexual function only (eg, arousal and pain disorders for women or erectile dysfunction for men). Finally, having had an STD, moderate to high alcohol consumption, and circumcision generally do not result in increased odds of experiencing sexual dysfunction.

Social status variables, which measure an individual's socioeconomic and normative position relative to other persons, assess how sociocultural position affects sexual function. Deterioration in economic position, indexed by falling household income, is generally associated with a modest increase in risk for all categories of sexual dysfunction for women but only erectile dysfunction for men. Normative orientation does not appear to have any impact on sexual dysfunction for women; men with liberal attitudes about sex, in contrast, are approximately 1³/₄ times more likely to experience premature ejaculation (95% CI, 1.2-2.5).

Finally, various aspects of sexual experience result in an increased risk of sexual dysfunction. Sexual history, indicated by having more than 5 lifetime partners and by masturbation practices, does not increase relative risk for either women or men. Women with low sexual activity or interests, however, have elevated risk for low sexual desire and

Sex Not Pleasurable		Anxious About Performance		Trouble Maintaining or Achieving an Erection	
No. (%)	Adjusted OR (95% CI)	No. (%)	Adjusted OR (95% CI)	No. (%)	Adjusted OR (95% CI)
1246		1247		1244	
39 (10)	Referent	77 (19)	Referent	30 (7)	Referent
30 (8)	0.95 (0.54-1.69)	65 (17)	0.98 (0.65-1.48)	35 (9)	1.46 (0.84-2.57)
25 (9)	1.04 (0.54-2.01)	55 (19)	1.09 (0.68-1.75)	31 (11)	1.84 (0.97-3.47)‡
10 (6)	0.73 (0.31-1.69)	25 (14)	0.87 (0.49-1.54)	31 (18)	3.59 (1.84-7.00)†
41 (6)	Referent	98 (14)	Referent	65 (9)	Referent
40 (11)	1.80 (1.02-3.18)†	78 (21)	1.71 (1.14-2.56)†	37 (10)	1.73 (1.00-2.97)†
21 (13)	2.27 (1.27-4.04)	45 (26)	2.29 (1.51-3.48)†	24 (14)	1.61 (0.96-2.71)‡
22 (14)	Referent	37 (23)	Referent	21 (13)	Referent
21 (6)	0.35 (0.17-0.68)†	65 (18)	0.68 (0.42-1.10)	32 (9)	0.64 (0.34-1.18)
39 (9)	0.59 (0.32-1.08)‡	77 (19)	0.70 (0.44-1.13)	43 (10)	0.76 (0.42-1.38)
21 (6)	0.44 (0.22-0.88)†	41 (13)	0.49 (0.28-0.83)†	31 (10)	0.66 (0.35-1.26)
70 (7)	Referent	173 (18)	Referent	98 (10)	Referent
23 (16)	2.33 (1.29-4.20)†	35 (24)	1.22 (0.76-1.95)	19 (13)	1.21 (0.67-2.17)
7 (8)	0.95 (0.40-2.29)	5 (5)	0.24 (0.09-0.61)†	5 (5)	0.53 (0.20-1.39)
4 (9)	1.29 (0.44-3.82)	9 (21)	1.33 (0.61-2.90)	5 (12)	1.17 (0.44-3.12)

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