

Distribution of the Brief Male Sexual Inventory in community men

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The objectives of the study were to characterize male sexual functioning as related to age in community-dwelling older men. In 1989, a random sample of men aged 40–79 y ($n = 2115$) without prior prostate surgery, prostate cancer, or other conditions known to affect voiding function (except benign prostatic hyperplasia) was invited (55% agreed) to participate in the Olmsted County Study of Urinary Symptoms and Health Status Among Men. In 1996, a previously validated male sexual function questionnaire was administered to the cohort. The questionnaire has 11 questions measuring sexual drive (two questions); erectile function (three) and ejaculatory function (two), as well as assessing problems with sex drive, erections, or ejaculation (three); and overall satisfaction with sex life (one). Each question is scored on a scale of 0–4, with higher scores indicating better functioning. Cross-sectional age-specific means (\pm s.d.) for drive, erections, ejaculation, problems, and overall satisfaction declined from 5.2 (\pm 1.5), 9.8 (\pm 2.5), 7.4 (\pm 1.4), 10.7 (\pm 2.2), and 2.6 (\pm 1.0), respectively, for men in their 40s to 2.4 (\pm 1.6), 3.3 (\pm 3.4), 3.6 (\pm 3.2), 7.7 (\pm 3.8), and 2.1 (\pm 1.2) for men 70 y and older (all $P < 0.001$). The cross-sectional decline in function with age was not constant, with age-related patterns differing by domain. The percentage of men reporting erections firm enough to have intercourse in the past 30 days declined from 97% (454/468) among those in their 40s to 51% (180/354) among those in their 80s ($P < 0.001$). In age-adjusted analyses, men reporting regular sexual partners had statistically significantly higher levels of sex drive, erectile function, ejaculatory function, and overall satisfaction than those who did not report regular sexual partners. Sexual drive, erectile functioning, ejaculatory functioning, and overall sexual satisfaction in men show somewhat differing cross-sectional patterns of decline with advancing age. Active sexual functioning is maintained well into the 80s in a substantial minority of community-dwelling men.

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Introduction

With the advent of new therapies for erectile dysfunction (ED) have come a proliferation of studies reporting the prevalence of ED. ED has been shown to increase with increasing age with prevalence estimates in community-based populations ranging from less than 1 to 11% for men in their 40s to 15–79% for men 70 and over.^{1–13} The wide variation in estimates may be partly because of the disparate definitions of ED between studies. Many of these studies focused largely on ED alone, and did

not provide information on other important aspects of sexuality in men.

The brief male sexual function inventory was developed as a validated, parsimonious way to characterize sexual function by clinicians and researchers.¹⁴ The questionnaire consists of questions regarding sex drive, erectile function, ejaculatory function, sexual problems with drive, erections and ejaculation as well as overall satisfaction with sex life. This report describes the prevalence of various aspects of male sexual functioning as measured by the Brief Male Sexual Function Inventory, and relates these measures to age and other factors in a randomly selected, population-based sample of men.

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Methods

The Olmsted County Study of Urinary Symptoms and Health Status Among Men is a prospective

cohort study begun in 1989 and has been described in detail in previous publications.^{15,16} Briefly, an age-stratified random sample was drawn from an enumeration of nearly all Caucasian male Olmsted County, MN residents between the ages of 40 and 79 y. Subjects were excluded if they had prior prostate surgery, prostate cancer, or any of a number of specified medical conditions that would affect normal urinary function (other than BPH). At baseline, participants in the community cohort ($n=2115$; 55% response rate) were visited in their homes and completed a previously validated self-administered questionnaire with a field research assistant present.¹⁵ Follow-up of participants by questionnaire has been conducted approximately every 2 y. Details of the cohort follow-up have been published previously.^{15,16} Men lost to follow-up were replaced by others from the community.¹⁶ In an effort to better understand their sexual function, a previously validated male sexual function index¹⁴ was included in the questionnaires administered to this cohort in 1996. The questionnaire consists of 11 questions comprising five sexual function domains: sexual drive (two items), erectile function (three items), ejaculatory function (two items), sexual problem assessment (three items), and sexual satisfaction (one item). Details on sexual function questionnaire development and validation are presented elsewhere.¹⁴ All questions were scored on a scale from 0 to 4 with domain scores equalling the sum of the individual questions comprising the domain. The range of the domain scores were 0–8 for sexual drive, 0–12 for erectile function, 0–8 for ejaculatory function, 0–12 for sexual problem assessment, and 0–4 for overall satisfaction with sex life, respectively. Lower domain scores indicate impaired sexual function.

Descriptive statistics and cumulative percentile plots were used to describe the distributions of the various domains by age group and frequency of responses for each question by age group. Spearman's rank correlation coefficients were used to describe the inter-relation between the various domains of the sexual function inventory (see Table 1). Analysis of covariance was used to investigate differences between individual sexual function domains while adjusting for age. Since the questionnaire elicited questions of a sensitive nature, some men refused to answer some of the questions. Missing data ranged from 12 to 14% for

individual questions. A total of 1883 men provided at least one answer on the sexual function questions. Missing questions within any domain resulted in a missing domain score for that domain. All available data were used in the analyses.

Results

The mean age of the cohort at questionnaire completion ($n=1883$) was 59.3 ± 10.5 y of age. In addition, the cohort was predominantly Caucasian with 91% reporting being married or living with a partner and 88% reporting having completed high school or higher. All domain scores appear to decline with advancing age, but sexual interest, problem assessment, and satisfaction showed less decline than erectile and ejaculatory function. Domain scores tended to be moderately to highly inter-related with Spearman's correlations ranging from 0.39 to 0.70 (Table 3). The cumulative percentile curves indicate a clear shift in the entire distribution toward greater sexual dysfunction with increasing age (Figure 1). Sexual function domain scores were lower with increasing age decade ($P<0.001$) for all the five domains, indicating greater impairment (Table 2).

Sexual drive domain

The mean sexual drive domain score decreased with increasing age with mean scores (\pm s.d.) ranging from $5.2 (\pm 1.5)$ for men in their 40s to $2.4 (\pm 1.6)$ for men 70 y of age and older. The proportion of men who reported having no days of sexual drive during the past 30 days increased with increasing age ranging from 1.3% for men in their 40s to 25.7% for men 70+ y of age (Table 3). Similarly, the proportion of men rating their level of sexual drive as 'none at all' ranged from almost 1% for men in their 40s to 21.8 for men 70 y and older.

Erectile function domain

Mean erectile function domain scores ranged from $9.8 (\pm 2.5)$ to $3.3 (\pm 3.4)$ for men in their 40s

Table 1 Intercorrelations (Spearman's r) between sexual function domains

Domain	Sexual drive	Erectile function	Ejaculatory function	Problem assessment	Sexual satisfaction
Sexual drive	1.00				
Erectile function	0.70	1.00			
Ejaculatory function	0.53	0.69	1.00		
Problem assessment	0.43	0.61	0.57	1.00	
Sexual satisfaction	0.39	0.51	0.45	0.57	1.00

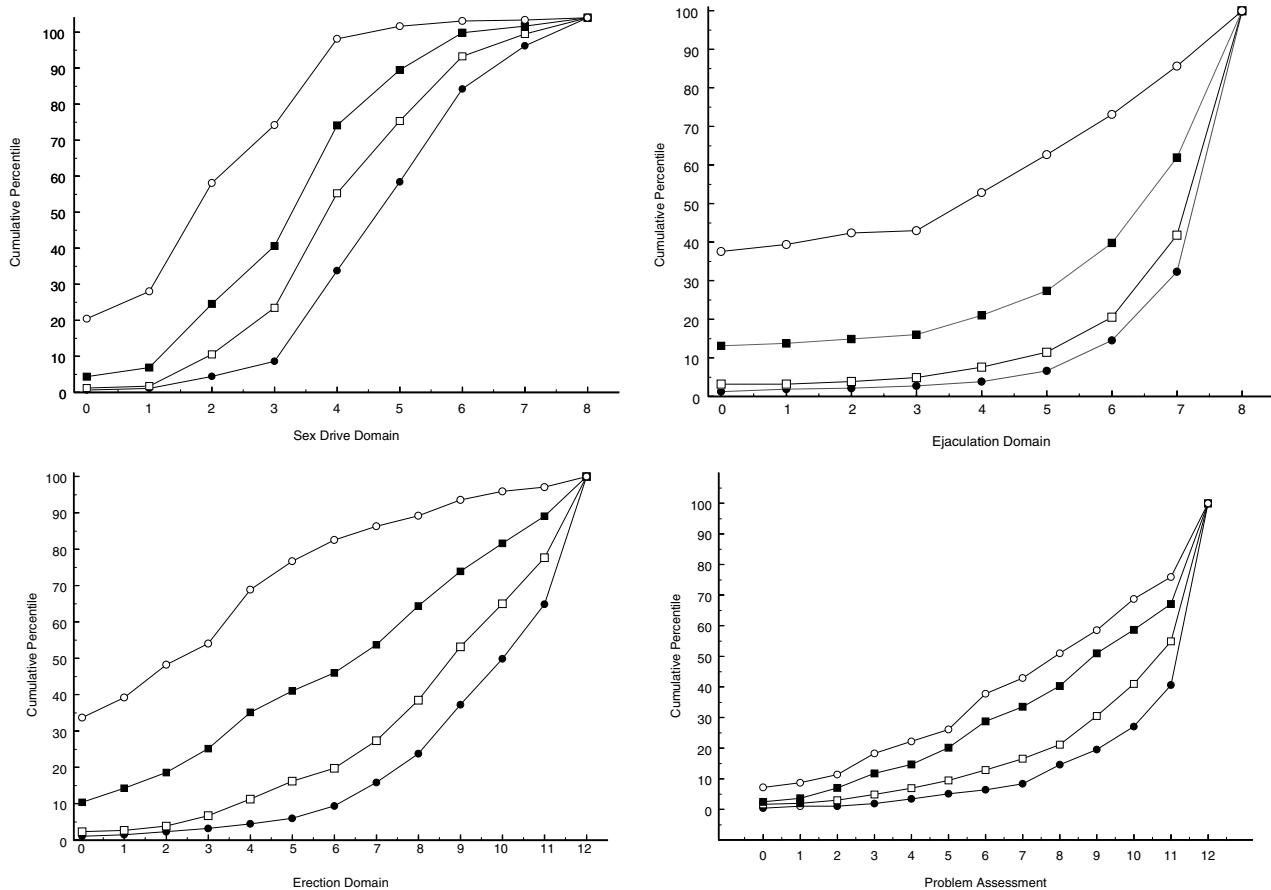


Figure 1 Cumulative percentile plots of sexual function domains of Brief Male Sexual Function Inventory. (Closed circles 40–49 y, open squares 50–59 y, closed squares 60–69 y, open circles 70–79 y old. Lower scores indicate lower functioning for each domain. These graphs depict the cumulative distribution of each of the sexual function domains. For example, for the sexual drive domain, approximately 4, 10, 24, and 56% of men 40–49, 50–59, 60–69, and 70 y or older respectively had a sex drive domain score of 2 or less.

and 70s, respectively. The percentage of men reporting not having any erections at all during the past 30 days ranged from about 1% of men in their 40s to 39% of men seventy and older. Slightly more than 2% of the men in their 40s reported not having had partial or full erection upon sexual stimulation compared with 38% of men 70 y and older. Reports of not having erections firm enough for sexual intercourse ranged from about 3% for 40 y old men to 49% for men 70 + y of age.

Ejaculatory function domain

Ejaculatory function also decreased with age, with mean scores ranging from 7.4 (± 1.4) for men in their 40s to 3.6 (± 3.2) for men 70 y and older (Table 2). Nearly 3% of the men in their 40s reported either not having climaxed or the amount of semen ejaculated to be a big problem versus about 43% of men in their 70s.

Problem-assessment domain

Mean sexual problem scores decreased (indicating worsening of the condition) with increasing age. For men in their 40s, 1–2% of the men considered a lack of sex drive, the ability to get and keep an erection and/or ejaculation to be a big problem, whereas 9–19% of the men 70 y and older considered these to be big problems (Table 3).

Sexual satisfaction

Almost 4% of men in their 40s reported being very dissatisfied with their sex life during the past 30 days. For men 70 y and older, about 14% reporting being very dissatisfied.

Differences in sexual function domains by regular sexual partner

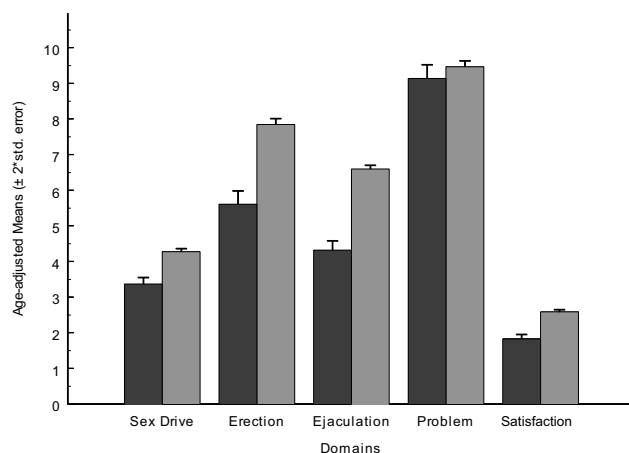
Interestingly, men who reported having regular sexual partners had significantly higher levels of

Table 2 Descriptive statistics for sexual function domains by age group (y)

	Mean \pm s.d. Median (Q1 ^a , Q3 ^b)	
Sexual drive (range: 0–8)		
40–49	5.2 \pm 1.5	5 (4, 6)
50–59	4.5 \pm 1.6	4 (4, 6)
60–69	3.7 \pm 1.7	4 (3, 5)
70+	2.4 \pm 1.6	2 (1, 4)
Erectile function (range: 0–12)		
40–49	9.8 \pm 2.5	11 (9, 12)
50–59	8.8 \pm 3.0	9 (7, 11)
60–69	6.5 \pm 3.8	7 (3, 10)
70+	3.3 \pm 3.4	3 (0, 5)
Ejaculatory function (range: 0–8)		
40–49	7.4 \pm 1.4	8 (7, 8)
50–59	7.0 \pm 1.7	8 (7, 8)
60–69	5.9 \pm 2.7	7 (5, 8)
70+	3.6 \pm 3.2	4 (0, 7)
Problem assessment (range: 0–12)		
40–49	10.7 \pm 2.2	12 (10, 12)
50–59	9.9 \pm 2.8	11 (9, 12)
60–69	8.6 \pm 3.5	9 (6, 12)
70+	7.7 \pm 3.8	8 (5, 11)
Sexual satisfaction (range: 0–4)		
40–49	2.6 \pm 1.0	3 (2, 3)
50–59	2.6 \pm 1.1	3 (2, 3)
60–69	2.3 \pm 1.1	2 (2, 3)
70+	2.1 \pm 1.2	2 (1, 3)

^aQ1=first quartile or 25th percentile.^bQ3=third quartile or 75th percentile.

Lower scores indicate lower sexual functioning.

**Figure 2** Age-adjusted means of sexual function domains by presence of regular sexual partner. Dark boxes: regular sexual partner, light boxes: no regular sexual partner. All *P*-values <0.001 except for sexual problem domain.

overall satisfaction as well as sex drive, erectile function, ejaculatory function (all *P*-values <0.001) than did those who reported no regular partner (Figure 2); however, there were no differences in reported levels of sexual problems (*P*=0.098) between those with and without regular sexual partners.

Discussion

ED

The prevalence of ED has been shown to increase with increasing age in many population-based studies. The Massachusetts Male Aging Study, a randomly selected, community-based study reported complete ED as ranging from 5.1% of men 40–50 y of age to 15% in men 61–70 y of age.³ In a study of 18–59 y olds, Laumann *et al*⁶ reported that 11% of 40 to 49-y-old men and 18% of 50 to 59-year-old men reported trouble achieving and maintaining an erection. In the Cologne Male Study involving almost 4500 30 to 80-y-old German men, Braun *et al*⁷ reported rates of ED ranging from 9.5% in 40 to 49-y-old men to 53.4% in men 70–80 y old.⁷ In a population study of almost 2200 men in Finland, 3% of men in their 50s reported complete ED defined as intercourse does not succeed compared to 30% for men in their 70s. In the Baltimore Longitudinal Study of Aging, ED reported for men in their 50s, 60s, 70s, and 80s were 8, 25, 55, and 75%, respectively.¹²

The wide variability of ED seen between studies may be due in part to differences in definitions of ED as well as differences in study design. Our results were similar in magnitude to those found in the MMAS where the study design was comparable. In contrast, our results were lower than that found in the Cologne study, where a mail-based questionnaire was sent to an age-stratified population of 8000 German men 30–80 y of age.

Ejaculatory dysfunction

Very few population-based studies have assessed ejaculatory function. In our study, the proportion of men reporting 'a lot of difficulty' ejaculating when they have been sexually stimulated ranged from 1.8% for men in their 40s to 6.8% for men 70 y and older. Nine percent of 40 to 49 and 50 to 59-y-old men participating in the National Health and Social Life Survey reported that they were unable to achieve orgasm.⁶ In a community-based study of 50 to 79-y-old French men, subjects reporting that they had ejaculation difficulty 'each time' ranged from 3% for men in their 50s to 12% for men in their 70s.² In the Krimpen study of male urogenital health, it was found that 4% of men younger than 65 y reported a complete absence of ejaculation when stimulated compared to 16% of men 65 y and older.⁹

In addition to ejaculatory difficulty, even fewer studies have reported problems with ejaculate volume. This may be because of the fact that respondents tend to poorly report ejaculatory function.¹⁴

Table 3 Frequency (percentage) of response by age decade (y)

	40–49	50–59	60–69	70+	All men
<i>1. During the past 30 days, on how many days have you felt sexual drive?</i>					
No days	6 (1.3)	8 (1.3)	29 (6.4)	92 (25.7)	135 (7.2)
Few days	17 (3.6)	71 (11.8)	104 (22.9)	126 (35.2)	318 (16.9)
Some days	146 (31.2)	255 (42.4)	205 (45.1)	121 (33.8)	727 (38.6)
Most days	192 (41.0)	201 (33.4)	86 (18.9)	16 (4.5)	495 (26.3)
Every day	107 (22.9)	67 (11.1)	30 (6.6)	3 (0.8)	207 (11.0)
<i>2. During the past 30 days, how would you rate your level of sexual drive?</i>					
None at all	3 (0.6)	10 (1.7)	20 (4.4)	78 (21.8)	111 (5.9)
Low	37 (7.9)	112 (18.6)	133 (29.3)	158 (44.1)	440 (23.4)
Medium	224 (47.9)	312 (51.7)	234 (51.5)	111 (31.0)	881 (46.8)
Medium high	164 (35.0)	132 (21.9)	56 (12.3)	8 (2.2)	360 (19.1)
High	40 (8.6)	37 (6.1)	11 (2.4)	3 (0.8)	91 (4.8)
<i>3. Over the past 30 days, how often have you had partial or full erections when you were sexually stimulated in any way?</i>					
Not at all	10 (2.1)	17 (2.8)	58 (12.7)	137 (38.3)	222 (11.8)
A few times	47 (10.0)	133 (22.2)	172 (37.8)	157 (43.8)	509 (27.1)
Fairly often	82 (17.5)	116 (19.3)	84 (18.5)	32 (8.9)	314 (16.7)
Usually	133 (28.4)	168 (28.0)	79 (17.4)	19 (5.3)	399 (21.2)
Always	196 (41.9)	166 (27.7)	62 (13.6)	13 (3.6)	437 (23.2)
<i>4. Over the past 30 days, when you had erections how often were they firm enough to have sexual intercourse?</i>					
Not at all	14 (3.0)	25 (4.1)	91 (20.2)	174 (49.1)	304 (16.2)
A few times	18 (3.8)	66 (11.0)	97 (21.5)	101 (28.5)	282 (15.0)
Fairly often	39 (8.3)	73 (12.1)	44 (9.8)	25 (7.1)	181 (9.6)
Usually	128 (27.3)	174 (28.9)	112 (24.8)	31 (8.8)	445 (23.7)
Always	269 (57.5)	264 (43.8)	107 (23.7)	23 (6.5)	663 (35.4)
<i>5. How much difficulty did you have getting an erection during the past 30 days?</i>					
Did not get erections at all	6 (1.3)	17 (2.9)	62 (14.0)	136 (39.0)	221 (11.9)
A lot of difficulty	8 (1.7)	26 (4.4)	46 (10.4)	44 (12.6)	124 (6.7)
Some difficulty	31 (6.6)	70 (11.8)	73 (16.4)	81 (23.2)	255 (13.7)
Little difficulty	122 (26.1)	183 (30.8)	125 (28.1)	53 (15.2)	483 (26.0)
No difficulty	300 (64.2)	299 (50.2)	138 (31.1)	35 (10.0)	772 (41.6)
<i>6. In the past 30 days, how much difficulty have you had ejaculating when you have been sexually stimulated?</i>					
No sexual stimulation in past month	8 (1.7)	29 (4.9)	66 (14.8)	155 (44.2)	258 (13.9)
A lot of difficulty	8 (1.7)	12 (2.0)	17 (3.8)	25 (7.1)	62 (3.3)
Some difficulty	23 (4.9)	49 (8.2)	62 (13.9)	61 (17.4)	195 (10.5)
Little difficulty	98 (21.0)	145 (24.3)	118 (26.5)	54 (15.4)	415 (22.3)
No difficulty	330 (70.7)	361 (60.6)	182 (40.9)	56 (15.9)	929 (50.0)
<i>7. In the past 30 days, how much did you consider the amount of semen you ejaculate to be a problem for you?</i>					
Did not climax	9 (1.9)	21 (3.5)	61 (13.7)	132 (39.2)	223 (12.1)
Big problem	4 (0.9)	5 (0.8)	9 (2.0)	13 (3.9)	31 (1.7)
Medium problem	9 (1.9)	17 (2.9)	24 (5.4)	19 (5.6)	69 (3.7)
Small problem	40 (8.6)	59 (9.9)	59 (13.3)	41 (12.2)	199 (10.8)
No problem	404 (86.5)	492 (82.8)	291 (65.5)	132 (39.2)	1319 (71.6)
<i>8. In the past 30 days, to what extent have you considered a lack of sex drive to be a problem?</i>					
Big problem	7 (1.5)	14 (2.4)	24 (5.4)	33 (9.5)	78 (4.2)
Medium problem	16 (3.4)	40 (6.8)	52 (11.7)	33 (9.5)	141 (7.6)
Small problem	36 (7.7)	62 (10.5)	77 (17.3)	69 (19.9)	244 (13.2)
Very small problem	73 (15.1)	133 (22.5)	98 (22.0)	79 (22.8)	383 (20.7)
No problem	334 (71.7)	341 (57.8)	194 (43.6)	133 (38.3)	1002 (54.2)
<i>9. In the past 30 days, to what extent have you considered your ability to get and keep erections to be a problem?</i>					
Big problem	11 (2.4)	37 (6.2)	52 (11.7)	65 (19.1)	165 (8.9)
Medium problem	18 (3.9)	38 (6.4)	69 (15.5)	50 (14.7)	175 (9.5)

Table 3 (*continued*)

	40–49	50–59	60–69	70+	All men
Small problem	30 (6.4)	68 (11.4)	70 (15.7)	60 (17.6)	228 (12.3)
Very small problem	77 (16.5)	109 (18.3)	83 (18.6)	58 (17.0)	327 (17.7)
No problem	330 (70.8)	344 (57.7)	171 (38.4)	108 (31.7)	953 (51.6)
10. In the past 30 days, to what extent have you considered your ejaculation to be a problem?					
Big problem	6 (1.3)	14 (2.3)	19 (4.3)	48 (14.3)	87 (4.7)
Medium problem	13 (2.8)	22 (3.7)	44 (9.9)	22 (6.5)	101 (5.5)
Small problem	18 (3.8)	38 (6.4)	54 (12.2)	60 (17.9)	170 (9.2)
Very small problem	51 (10.9)	81 (13.6)	66 (14.9)	49 (14.6)	241 (13.4)
No problem	379 (81.2)	441 (74.0)	261 (58.8)	157 (46.7)	1238 (67.2)
11. Overall, during the past 30 days, how satisfied have you been with your sex life?					
Very dissatisfied	17 (3.7)	27 (4.6)	32 (7.2)	49 (14.5)	125 (6.8)
Mostly dissatisfied	41 (8.8)	61 (10.3)	75 (16.8)	36 (10.7)	213 (11.6)
Neutral or mixed	126 (27.1)	140 (23.7)	126 (28.2)	119 (35.3)	511 (27.8)
Mostly satisfied	187 (40.2)	246 (41.6)	147 (32.9)	82 (24.3)	662 (36.0)
Very satisfied	94 (20.2)	117 (19.8)	67 (15.0)	51 (15.1)	329 (17.9)

For our cohort, 2% of men in their 40s reported not climaxing versus 40% of men in their 70s. In addition, almost 1% of 40-y-old men considered the amount of semen ejaculated to be a big problem compared to 3.4% of men in their 70s. Other studies tended to report higher proportions than our study. In a community study of 423 men in the UK, 7% of men in their 40s reported reduced ejaculation compared to 78% of men in their 70s.⁴ Blanker *et al*⁹ reported reduced ejaculation in 4% of the men less than 65 y of age versus 10% in men 65 y and older.

Sex drive

A surprisingly high proportion of men report sex drive well into older age. Other population based studies have reported similar maintenance of sexual activity in aging men. Persson¹⁰ reported that 46% of Swedish men aged 70 y were still having intercourse. Pfeiffer *et al*¹¹ reported that only 28% of men in this age group were having regular intercourse. A later follow-up of this group indicates that only 20% of men were still sexually active by age 78 y.¹¹ In the Baltimore Longitudinal Study of Aging, 55% of men age 75 y, and 75% of men age 80 y report no erections at all.¹²

Sexual satisfaction

Similar to the other domains, sexual dissatisfaction (ie, very dissatisfied or mostly dissatisfied) in-

creased with age (12.4–25.6% for men 40–70+, respectively). This was much lower than what was found in the Cologne Male Study where 32% of 40-y olds were unhappy with their current sex life compared to 44% of 70-y olds.⁷

Problem assessment

Men vary greatly in the way they are affected by sexual dysfunction. As such, the problem-assessment questions are an important aspect of sexual function. Men may not consider low response levels on certain questions to be a problem, particularly if they have low sexual desire. Although 9–79% of men 40–79 y reported problems of reduced rigidity of erections as reported by Frankel *et al*,⁴ only 25–53% of those reporting problems stated that reduced rigidity was a problem. In the same study, 18–21% of men reporting reduced ejaculation stated that reduced ejaculation was a problem. In our study, 2.3–8.8% of men 40–70+ y reported that their ability to get and keep erections was a big problem, 0.9–3.4% of men 40–70+ y reported that the amount of semen that they ejaculate was a big problem, and 1.3–9.3% of men 40–70+ y reported that their lack of sex drive was a big problem.

Summary

As found in previous studies, an age-related decrease in erectile function and sexual functioning was found for all sexual function domains assessed.

As life expectancy nears 80y in most developed countries, concern with sexual problems and interest in therapeutic strategies will likely increase. In this cohort of community men, it is clear that although all domains of sexual function decline with age, sexual desire is maintained well into the eighth decade in most men, and a substantial minority of these men still report good overall sexual function. In this population, men with regular partners report better sexual function than those who have none. This seems intuitive, but it has not been well documented in previous studies. The age-related cross-sectional decline in self-report of ejaculatory ability is less rapid than self-reported erectile ability. Men report that their ejaculatory ability declines less rapidly than erectile ability. The reasons for the decline in sexual function in this study cohort are not clear, and are no doubt multifactorial, including psychological as well as physiological causes. However, given the cross-sectional nature of these results, no causal inference can be made. In addition, disparate definitions of sexual function components between studies may have also contributed to the wide variability of reported results.

This study provides normative data for various aspects of sexual function in a randomly selected community-based sample of men. This parsimonious set of questions has been shown to be both valid and reliable, and can be used by urologic researchers in the evaluation of men on treatment or with conditions that may affect their sexual function. In addition, this questionnaire may be useful in the office setting to assess sexual function as part of everyday care, especially since normative population data are now available. Further research is needed with the Brief Male Sexual Function Inventory to determine which cut points of the sexual function domains are optimal for identifying clinically significant sexual dysfunction. Moreover, normative data of the Brief Male Sexual Function Inventory in other countries need to be established to facilitate comparisons between cultures.

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