Frailty and Sexual Health in Older European Men

David M. Lee,1 Abdelouahid Tajar,2 Rathi Ravindrarajah,3 Stephen R. Pye,1 Daryl B. O’Connor,4 Giovanni Corona,5 Matthew O’Connell,3 Evelien Gielen,6 Steven Boonen,6 Dirk Vanderschueren,7 Neil Pendleton,8 Joseph D. Finn,9 György Bartfai,9 Felipe F. Casanueva,10 Gianni Forti,5 Aleksander Giwercman,11 Thang S. Han,12 Ilpo T. Huhtaniemi,13 Krzysztof Kula,14 Michael E. J. Lean,15 Margus Punab,16 Frederick C. W. Wu,3 Terence W. O’Neill,1 and the European Male Aging Study Group

1Arthritis Research UK Epidemiology Unit, The University of Manchester, Manchester, UK.
2Centre for Statistics in Medicine, University of Oxford, Oxford, UK.
3Department of Medicine, The University of Manchester, Manchester Royal Infirmary, Manchester, UK.
4Institute of Psychological Sciences, University of Leeds, Leeds, UK.
5Department of Clinical Physiopathology, University of Florence, Florence, Italy.
6Department of Geriatric Medicine, Katholieke Universiteit Leuven, Leuven, Belgium.
7Department of Andrology and Endocrinology, Katholieke Universiteit Leuven, Leuven, Belgium.
8School of Community Based Medicine, The University of Manchester, Salford Royal NHS Trust, Salford, UK.
9Department of Obstetrics, Gynecology and Andrology, Albert Szent-György Medical University, Szeged, Hungary.
10Department of Medicine, Santiago de Compostela University, Santiago de Compostela, Spain.
11Reproductive Medicine Center, Malmö University Hospital, Malmö, Sweden.
12Department of Endocrinology, Royal Free and University College Hospital Medical School, London, UK.
13Department of Reproductive Biology, Imperial College London, London, UK.
14Department of Andrology and Reproductive Endocrinology, Medical University of Łódź, Łódź, Poland.
15Division of Developmental Medicine, Human Nutrition Section, University of Glasgow, Glasgow, UK.
16Andrology Unit, Unitied Laboratories of Tartu University Clinics, Tartu, Estonia.

Address correspondence to David M. Lee, PhD, Arthritis Research UK Epidemiology Unit, Stopford Building, The University of Manchester, Oxford Road, Manchester M13 9PT, UK. Email: david.m.lee@manchester.ac.uk

Background. There has been little research on how late-life frailty interrelates with sexual health. Our objective was to examine the association of frailty with sexual functioning and satisfaction among older men.

Methods. The study population consisted of 1,504 men aged 60 to 79 years, participating in the European Male Aging Study. Self-report questionnaires measured overall sexual functioning, sexual function–related distress, and erectile dysfunction. Frailty status was defined using a phenotype (FP) or index (FI). Associations between frailty and sexual function were explored using regression models.

Results. Based on the frailty phenotype, 5% of men were classified as frail, and the mean frailty index was 0.18 (SD = 0.12). Frailty was associated with decreasing overall sexual functioning and increasing sexual function–related distress in multiple linear regressions adjusted for age, smoking, alcohol consumption, living arrangements, comorbidities, and depression. Frailty was also associated with an increased odds of erectile dysfunction after adjustment for the same confounders; odds ratio = 1.99 (95% confidence interval = 1.14, 3.48) and 4.08 (95% confidence interval = 2.63, 6.36) for frailty phenotype and frailty index, respectively.

Conclusions. Frailty was associated with impaired overall sexual functioning, sexual function–related distress, and erectile dysfunction. Individuals assessed for frailty-related deficits may also benefit from an appraisal of sexual health as an important aspect of well-being and quality of life.

Key Words: Frailty—Sexual function—Male health—EMAS.

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Sexual health is a key element of overall health and quality of life (1,2), but little is known about how frailty interrelates with sexual function and satisfaction among older people. Studies have shown that sexual dysfunction is associated with poorer health (3–5), with sexual problems more strongly related to physical health than chronological age alone (2,6). Declines in physical and psychological functioning are linked to the aging process, and one approach to describe this state of “unsuccessful aging” has been the development of the concept of a frailty phenotype (FP) or frailty index (FI) (7). Frailty is commonly defined as a state of diminished resilience or vulnerability to stressors (8). Its core feature is suggested to be loss of homeostatic reserve arising from declines in multiple physiological
systems with increasing age (9). Definitions include the FP described by Fried and colleagues (10) based on five specific criteria representing key attributes in a progressive frailty cycle and the FI of Rockwood and colleagues (11), which reflects an age-related accumulation of deficits (symptoms, signs, functional impairments).

Although both definitions have proved useful in predicting adverse health outcomes (12–14), little is known about how frailty affects sexuality, whether particular domains of sexual functioning are differentially associated with frailty, and whether mental health mediates any relationships. If the concept of frailty captures functional declines more inclusively than chronic diseases or health behaviors alone (9) and if frailty is potentially reversible (15,16), understanding its relationship with sexual functioning may provide opportunities for interventions to improve not only sexual health but also physical and psychological well-being more generally.

Our primary objective was to determine the relationship of frailty with sexual function in a community sample of older men. We also examined potential confounding by lifestyle and health-related factors and whether depression or cardiovascular disease mediated associations between frailty and sexual health.

**METHODS**

**Participants and Design**

The European Male Aging Study (EMAS) design and methods have been described previously (17). A total of 3,369 men aged 40–79 years were recruited from population registers in eight centers: Florence (Italy), Leuven (Belgium), Łódź (Poland), Malmö (Sweden), Manchester (UK), Santiago de Compostela (Spain), Szeged (Hungary), Tartu (Estonia). Participants completed an interviewer-assisted questionnaire, functional assessments and provided a fasting blood sample. Ethical approval and written informed consent were obtained in each center. We were interested in the link between frailty and sexual function primarily in older men and restricted the analysis, therefore, to those aged 60 years and older.

**Assessments**

Participants were asked about their general health and lifestyle, including smoking and alcohol consumption. Data on morbidities covered self-reported heart conditions, hypertension, bronchitis, asthma, diabetes, liver disease, kidney conditions, prostate disease, thyroid disorders, cancer, and stroke.

The assisted questionnaire included the Medical Outcomes Study 36-item Short Form survey (18), Physical Activity Scale for the Elderly (19), Reuben’s Physical Performance test (20), Beck’s Depression Inventory-II (21), and Tinetti’s balance and postural stability index (22). Anthropometric measurements included height, weight, mid-upper arm circumference, and triceps skinfold thickness.

A fasting morning blood sample was obtained for hormone assessments, and processed serum was stored at −80°C. A validated gas chromatography–mass spectroscopy system (23) was used to analyze testosterone (T) (intra-assay coefficient of variation, 2.9%; interassay coefficient of variation, 3.4%) and estradiol (E2) (intra-assay coefficient of variation, 3.5%; interassay coefficient of variation, 3.7%).

**Frailty**

Frailty was assessed using a phenotypic definition adapted from the Cardiovascular Health Study (10) based on five criteria: sarcopenia, exhaustion, slowness, weakness, and low activity. The EMAS FP has been described previously (24), and details of the EMAS criteria alongside the Cardiovascular Health Study original are shown in Supplementary material. The FP variable was categorized as follows: 0 criteria = robust, 1–2 criteria = prefrail, and 3+ criteria = frail. The EMAS FP has been shown to be linked with increasing age, falls, and impaired quality of life (24).

We also assessed frailty using the concept of deficit accumulation and calculated an FI, representing the number of health deficits present in an individual divided by the number of deficits considered (9,25). Forty-three deficits were included in the FI, representing symptoms, signs, or functional impairments that accumulate with age and are individually related to adverse outcomes. The EMAS FI has been described previously (26) and includes items from the Medical Outcomes Study 36-item Short Form survey, Beck’s Depression Inventory-II, Reuben’s Physical Performance test, Tinetti scale, in addition to morbidities, medication use, and cognitive function. Binary variables were recoded such that 0 indicated the absence and 1 the presence of a deficit. For categorical variables with an intermediate response (eg, sometimes/maybe), an additional value of 0.5 was used. Continuous variables were dichotomized based on the distribution of participants’ scores; cut points were the worst-performing 10th centile. Although the FI is a continuous variable, we also categorized it into three groups: low FI = robust, ≥ 0 FI ≤ 0.2; medium FI = prefrail, > 0.2 FI ≤ 0.35; and high FI = frail, >0.35 FI, by means of threshold levels suggested by Kulinski and colleagues using data from the Cardiovascular Health Study (25), solely to allow a more direct comparison with the EMAS FP.

**Sexual Function**

Participants completed the EMAS Sexual Function Questionnaire (EMAS-SFQ) in private and sealed the questionnaire in an envelope upon completion. The EMAS-SFQ includes 16 items assessing sexual functioning and has excellent internal and test–retest reliability, as well as convergent, divergent, and discriminant validity (27). Principal component analysis of the EMAS-SFQ identified five distinct domains (27): overall sexual functioning (OSF), sexual function–related distress (SFD), change in sexual...
functioning (CSF) compared with 1 year ago, frequency of masturbation (M), and erectile dysfunction (ED).

All domains from the EMAS-SFQ were used in this analysis and are described in Supplementary material. Lower OSF scores and higher SFD and CSF scores represent worse sexual functioning. The four category response for ED ranged from always able to never able to get and keep an erection, which would be good enough for sexual intercourse. The eight category response for M ranged from not at all to more than once a day. The EMAS-SFQ also included a question about current living arrangements.

Statistical Analysis
Analyses were conducted using STATA SE v11.2 (StataCorp, College Station, TX). Participants aged less than 60 years (n = 1700) and those aged 60–79 years with missing FP data (n = 165) were excluded, leaving 1,504 men in the analysis. Descriptive statistics were used to summarize OSF, SFD, and CSF scores, T and E2 levels, and other participant characteristics. Smoking was categorized as current versus never/ex-smoker; alcohol consumption as intake on ≥1 day/week versus <1 day/week; and morbidities as none versus any. Depression was identified using Beck’s Depression Inventory-II (0–13, no depression; 14–63, mild to severe depression) (21) or if participants reported using antidepressants; cardiovascular disease (CVD) as those reporting they were “currently being treated for a heart condition/high blood pressure” and/or “had ever suffered a stroke.” We used ANOVA or Kruskal–Wallis to test associations between FP and continuous variables and the Chi-square test for associations with categorical variables.

Linear regression was used to examine the association between FP status and OSF, SFD, and CSF, with the sexual function scores as the dependent variables. Adjustments were made for age, center, and additional variables, which were significantly associated with frailty status, including smoking, alcohol consumption, morbidities, living arrangement, and depression. Results were expressed as β-coefficients and 95% confidence intervals. The association of FI (continuous) with sexual function was evaluated graphically (age adjusted) using locally weighted scatterplot smoothing (28). Linear regression was also used to model the association between FI and sexual function, with adjustments made for age, center, smoking, alcohol consumption, and depression. Adjustments for morbidities were not made in these models as chronic diseases were counted as deficits when constructing the FI.

As we have previously shown that T levels are positively related with OSF and E2 levels negatively with SFD (29), adjustments were made for these hormones in models where frailty was significantly associated with sexual function. Sobel–Goodman tests (30) were used to examine whether depression or CVD were possible mediators of significant associations between FI (continuous) and the sexual function scores.

Associations of frailty with ED and M were examined using ordinal logistic regressions to calculate the odds of being in a higher outcome category associated with a unit increase in the value of the independent variable (31). Frailty status was categorized from the FP or FI as before, whereas ED and M were treated as ordinal outcomes (ED: four categories, M: eight categories). Ordinal models were adjusted for age, center, smoking, alcohol consumption, living arrangement, and depression (plus morbidities in FP models), with results presented as odds ratios and 95% confidence interval. Nonviolation of the parallel slope assumption was confirmed using the Brant test.

RESULTS
Participants
Characteristics of the 1,504 men included in the analysis by FP status are shown in Table 1. Being prefrail or frail was associated with significantly lower OSF scores although the relationship with higher SFD or CSF scores was less marked. Compared with robust men, prefrail or frail men were older and had higher Beck’s Depression Inventory-II and FI scores. Prefrail or frail men were also more likely to have ED, currently smoke, have one or more morbidities, live alone, and consume alcohol less frequently than robust men. The FI ranged from 0 to 0.69, and when categorized into three groups to facilitate comparison with the FP, the numbers of men in each category were as follows: low FI−robust = 990 (65.8%); medium FI−prefrail = 380 (25.3%); high FI−frail = 134 (8.9%).

FP and Sexual Function
Table 2 summarizes the results from the linear regressions examining the relationship between FP and sexual function. Models are presented unadjusted[Model 1] and adjusted for age, center, smoking, alcohol consumption, living arrangement, morbidities, and depression[Model 2]. In unadjusted models, FP status was significantly associated with OSF, such that participants who were frail scored around 6 points lower than robust men. A more modest relationship was seen between FP and SFD (frail: β = 1.01, p = .04), whereas no association was observed with CSF. Following adjustment, a significant association was only seen between FP and OSF; and this was limited to prefrail men scoring an average of 1.5 points lower (β = −1.46, p < .001) than robust men. Inclusion of T as a covariate in Model 2 did not change the magnitude of the relationship between FP and OSF (prefrail vs robust: β = −1.43, p = .001; frail vs robust: β = −1.33, p = .19).

FI and Sexual Function
Locally weighted scatterplot smoothing analyses simultaneously exploring the associations of FI (continuous) and age with the sexual function scores (Figure 1) indicated the same “directionality of relationship” of both the FI and
age with OSF and CSF although increasing FI was associated with higher and increasing age with lower SFD scores. There was no evidence of any threshold effects.

Unadjusted linear regressions revealed that a higher FI was significantly associated with lower OSF and higher SFD and CSF with FI as either a continuous variable or categorized into low/medium/high FI groups (Table 3). The associations of age with sexual function in these models were in agreement with the relationships seen in the locally weighted scatterplot smoothing analyses (Figure 1), ie, OSF: $\beta = -0.31, p < .001$; SFD: $\beta = -0.07, p < .001$; CSF: $\beta = 0.03, p = .08$. Additional adjustment for smoking, alcohol consumption, living arrangement, and depression resulted in significant associations only between FI and the OSF and SFD scores. Inclusion of T as a covariate in Model 2 did not change the magnitude of the relationship between FI (continuous) and OSF ($\beta = -1.14, p < .001$), whereas inclusion of E2 in model 2 did not change the relationship between FI and SFD ($\beta = 0.44, p < .001$).

To examine whether depression or CVD was a potential mediator of the relationship between FI (continuous) and OSF and SFD, we performed Sobel–Goodman tests (30). The age-adjusted models were as follows: regressing the dependent variable (OSF or SFD) on the independent variable (FI); regressing the mediating variable (depression or CVD) on the independent variable; and regressing the Table 1. Characteristics of EMAS Sample (60+ y) by Frailty Phenotype

|                      | Total Sample N = 1504 | Robust 876 (58.2%) | Pre frail 552 (36.7%) | Frail 76 (5.1%) | p Value
<table>
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<tbody>
<tr>
<td>Overall sexual functioning</td>
<td>17.6 (7.0)</td>
<td>19.0 (6.5)</td>
<td>15.7 (7.1)</td>
<td>12.7 (6.3)</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Sexual function-related distress</td>
<td>7.4 (3.53)</td>
<td>7.2 (3.4)</td>
<td>7.6 (3.8)</td>
<td>8.2 (3.7)</td>
<td>.06</td>
</tr>
<tr>
<td>Change in sexual functioning</td>
<td>17.1 (2.9)</td>
<td>17.0 (2.8)</td>
<td>17.3 (3.2)</td>
<td>17.7 (3.5)</td>
<td>.04</td>
</tr>
<tr>
<td>Age (years)</td>
<td>69.5 (5.7)</td>
<td>68.4 (5.5)</td>
<td>70.9 (5.6)</td>
<td>72.9 (4.7)</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Beck’s Depression Inventory-II</td>
<td>7.4 (6.4)</td>
<td>5.8 (4.7)</td>
<td>8.9 (7.2)</td>
<td>15.8 (8.5)</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Body mass index (kg/m²)</td>
<td>27.8 (4.0)</td>
<td>27.8 (3.4)</td>
<td>27.9 (4.6)</td>
<td>27.4 (4.8)</td>
<td>.57</td>
</tr>
<tr>
<td>Testosterone (nmol/L)</td>
<td>16.3 (6.2)</td>
<td>16.7 (6.0)</td>
<td>15.9 (6.4)</td>
<td>15.7 (5.9)</td>
<td>.08</td>
</tr>
<tr>
<td>Estradiol (pmol/L)</td>
<td>76.8 (25.7)</td>
<td>75.8 (24.1)</td>
<td>78.0 (28.0)</td>
<td>79.7 (26.2)</td>
<td>.19</td>
</tr>
<tr>
<td>Frailty index</td>
<td>0.18 (0.12)</td>
<td>0.13 (0.09)</td>
<td>0.22 (0.12)</td>
<td>0.37 (0.11)</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Number (%)¹</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Erectile dysfunction²</td>
<td>700 (50.3)</td>
<td>350 (41.9)</td>
<td>302 (61.1)</td>
<td>48 (77.4)</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Masturbation (≥once/week)</td>
<td>140 (9.8)</td>
<td>91 (10.9)</td>
<td>46 (8.8)</td>
<td>3 (4.4)</td>
<td>.14</td>
</tr>
<tr>
<td>Smoking status (current)</td>
<td>209 (14.0)</td>
<td>99 (11.4)</td>
<td>91 (16.8)</td>
<td>19 (25.0)</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Alcohol intake (≥1 d/week)</td>
<td>794 (53.2)</td>
<td>495 (58.6)</td>
<td>272 (49.8)</td>
<td>27 (36.0)</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Obesity (BMI ≥ 30 kg/m²)</td>
<td>374 (25.0)</td>
<td>207 (23.7)</td>
<td>149 (27.3)</td>
<td>18 (24.0)</td>
<td>.31</td>
</tr>
<tr>
<td>Depression³</td>
<td>276 (18.4)</td>
<td>90 (10.3)</td>
<td>139 (25.2)</td>
<td>47 (61.8)</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Cardiovascular diseases⁴</td>
<td>778 (51.7)</td>
<td>413 (47.2)</td>
<td>314 (56.9)</td>
<td>51 (67.1)</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Comorbidities (1+)⁵</td>
<td>1058 (71.3)</td>
<td>565 (65.2)</td>
<td>426 (78.5)</td>
<td>67 (88.2)</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Living arrangement</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Living with wife</td>
<td>1162 (79.9)</td>
<td>701 (81.6)</td>
<td>414 (78.7)</td>
<td>47 (68.1)</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Living with partner</td>
<td>62 (4.3)</td>
<td>39 (4.5)</td>
<td>23 (4.4)</td>
<td>0 (0)</td>
<td></td>
</tr>
<tr>
<td>Partner, living apart</td>
<td>78 (5.4)</td>
<td>57 (6.6)</td>
<td>19 (3.6)</td>
<td>2 (2.9)</td>
<td></td>
</tr>
<tr>
<td>No partner</td>
<td>152 (10.5)</td>
<td>62 (7.2)</td>
<td>70 (13.3)</td>
<td>20 (29.0)</td>
<td></td>
</tr>
</tbody>
</table>

Notes: SD = standard deviation.
¹p value for continuous variables from ANOVA or Kruskal–Wallis.
²p value for categorical variables from Chi-square test.
³“Sometimes able” to “Never able” to attain an erection.
⁴Beck’s Depression Inventory-II ≥ 14 and/or using antidepressants.
⁵Self-reported heart condition, high blood pressure, and/or stroke.
⁶Includes cardiovascular diseases, cancer, bronchitis, asthma, diabetes, and liver, kidney, and prostate disease.

Table 2. Association of Frailty Phenotype (FP) With Sexual Function: Linear Regressions

<table>
<thead>
<tr>
<th>FP Categories</th>
<th>OSF</th>
<th>SFD</th>
<th>CSF</th>
</tr>
</thead>
<tbody>
<tr>
<td>Robust</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pre frail</td>
<td>-3.28 (-4.12, -2.43)**</td>
<td>0.33 (-0.10, 0.76)</td>
<td>0.35 (-0.01, 0.70)</td>
</tr>
<tr>
<td>Frail</td>
<td>-6.30 (-8.31, -4.28)**</td>
<td>1.01 (0.03, 1.98)*</td>
<td>0.77 (-0.04, 1.57)</td>
</tr>
<tr>
<td>Model 2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Robust</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pre frail</td>
<td>-1.46 (-2.26, -0.66)**</td>
<td>0.24 (-0.21, 0.69)</td>
<td>0.01 (-0.36, 0.38)</td>
</tr>
<tr>
<td>Frail</td>
<td>-1.61 (-3.51, 0.29)</td>
<td>0.35 (-0.67, 1.38)</td>
<td>-0.28 (-1.13, 0.57)</td>
</tr>
</tbody>
</table>

Notes: CI = confidence interval; CSF = change in sexual functioning; Model 1 = unadjusted; Model 2 = adjusted for age, center, smoking, alcohol consumption, living arrangement, comorbidities, and depression; OSF = overall sexual functioning; SFD = sexual function-related distress.
²p < .05, **p < .01, ***p < .001.
dependent variable on both the independent and mediating variables. For depression, the tests were significant for both OSF ($p = .02$) and SFD ($p < .001$), with the total effect mediated by depression equal to 12% for OSF and 47% for SFD. For CVD, the tests were only significant with OSF ($p = .03$), with 10% of the total effect mediated by CVD.

Table 4 summarizes the ordinal logistic regressions with ED as the outcome. Significant unadjusted associations were observed between ED and frailty status using either the FP or the FI categories (all $p < .001$). After adjusting for age, center, health, and lifestyle factors (Model 2), the

Frailty, Erectile Dysfunction, and Masturbation

Figure 1. Relationship of EMAS frailty index and age with sexual function scores: locally weighted scatterplot smoothing plots.
relationship between frailty and ED was attenuated but remained significant in all cases \( p < .05 \). Further adjustment of the FP and FI models for T did not change these relationships (data not shown). No association between frailty and M was observed in any of the ordinal logistic regressions \( p > .05 \), data not shown. Sobel–Goodman tests confirmed that both depression and CVD met the statistical criteria as potential mediators of the association between FI (continuous) and ED (both \( p = .03 \)), with depression mediating 10% and CVD 9.5% of the total effect.

**Discussion**

This is the first population-based study to reveal an association between frailty and poorer sexual functioning. Frailty status was associated more strongly with OSF and ED than with SFD or CSF, suggesting our measures of frailty better reflect deficits in physical, rather than psychological aspects of male sexual health.

Previous observational studies have shown that sexual functioning is associated with physical and mental health although much of this earlier work focused on the impact of specific morbidities \( (1–5) \). Lindau and colleagues reported among a representative sample of older U.S. adults that diabetes was positively associated with ED, a lower prevalence of partnered sexual activity and masturbation \( (2) \). We have similarly observed associations between various comorbid conditions (CVD, diabetes, obesity) and the likelihood of reporting sexual function problems \( (32) \). However, an advantage of using frailty to assess health status is that it provides a conceptual basis to move away from organ- and disease-based approaches to a healthiness-based one \( (7) \). If older people with diminished resilience can be more accurately identified using a frailty assessment, then this presents opportunities for more timely health and lifestyle interventions. Recent data suggest that the development of frailty is a dynamic, potentially reversible process \( (15,16,33) \). Controlled trials have demonstrated improvements in physical function among older adults with mild or moderate frailty following a physical therapy program \( (33,34) \). If functional ability can be improved by such interventions, a more holistic assessment of individuals in relation to aspects of their sexual function and satisfaction, together with assessments of depression and other lifestyle factors, may facilitate improved individualized care. Recognizing that sexual health may be an unspoken quality-of-life issue for frail individuals could also improve the relationship between physician and patients, with better outcomes for the latter. Interestingly, our data suggest that while SFD decreases with increasing age, the inverse is true with increasing FI. Although this observation agrees with previous reports of older individuals accepting declining sexual performance as an inevitable part of aging \( (2,32,35) \), it also suggests that frailty may, in part, influence sexual satisfaction independently of age.

How frailty is defined can markedly affect its estimated prevalence, with van Iersel and colleagues reporting that frailty occurrence ranged from 33% to 88% in a sample of elderly patients admitted to an acute geriatric ward, depending on the criteria used \( (36) \). We categorized the EMAS FI into low, medium, and high FI groups purely to facilitate comparison with the FP categories. However, the proportion of prefrail and frail (or medium FI and high FI) participants differed markedly between our FP and FI definitions, with only 46 men defined as frail by both definitions. The differing associations between sexual function
and the FP or FI categories are unsurprising given the differences in the underlying criteria (37). The relationship of frailty with OSF and SFD appeared more robust using the FI versus the FP. This could be due to the FI providing a more holistic measure of frailty in relation to its inclusion of physical and psychological traits affected by aging. Indeed, a recent review of frailty instruments suggests that the FI is the most suitable construct for use as an evaluative outcome measure (38). The differences may also relate to statistical power, that is, more men categorized as frail using the FI versus the FP. Nonetheless, the trends were similar in respect to associations between sexual function and either the FP or FI, with the relationship between frailty and sexual function most robust with OSF. This probably reflects the physical health bias of the frailty instruments used here and the OSF that measures the frequency of sexual functioning. Irrespective of the definitions used, our study supports previous observations that the prevalence of frailty is relatively low among older community-dwelling individuals (39–41). Whether our FP and FI models relate to different outcomes or identify different trajectories to the same adverse outcomes requires further investigation.

Although associations between sexual health and either psychological well-being or CVD have been documented in a number of previous studies (1,32,42,43), it remains unknown whether depression or CVD mediates the relationship between frailty and sexual health. Sobel–Goodman tests showed that while depression mediated only 12% and 10% of the total effect of FI on OSF and ED, respectively, it mediated almost half of the total effect of FI on SFD. The total effect of FI on both OSF and ED mediated by CVD was also ~10%. These results suggest that frailty (assessed using FI) may affect SFD directly as well as indirectly via depression. However, it is possible that depression is a proxy for some other mechanism, ie, our cross-sectional data are not inconsistent with mediation.

The main strengths of EMAS are a large community–based sample and use of uniform methods to assess frailty, sexual function, and potential confounders. Although limitations of the study have been described (17), certain factors need to be highlighted here. We enrolled mainly Caucasian men with a study response rate of 41%, which could limit generalizability. Although sexual function assessments were language dependent, the EMAS-SFQ was professionally translated from English into each center’s language and back-translated to resolve discrepancies. The cross-sectional design precluded study of the temporal relationship between frailty and SFD. This probably reflects the physical health bias of the frailty instruments used here and the OSF that measures the frequency of sexual functioning. Irrespective of the definitions used, our study supports previous observations that the prevalence of frailty is relatively low among older community-dwelling individuals (39–41). Whether our FP and FI models relate to different outcomes or identify different trajectories to the same adverse outcomes requires further investigation.

In conclusion, frailty among older men was associated with poorer OSF and erectile function. The association between frailty and SFD was weaker and appeared to be extensively mediated by depression. Our data suggest that men’s health providers should be attentive to their patients’ sexual health when assessing frailty-related deficits. This would not only provide a more holistic assessment of late-life health, well-being, and quality of life but would also present the opportunity to help individuals maintain their sexual function or regain it in the face of chronic diseases and their treatments.

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**Supplementary Material**

Supplementary material can be found at: http://biomedgerontology.oxfordjournals.org/


