



## Research paper

## Decline in sexuality and wellbeing in older adults: A population-based study

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## ABSTRACT

**Background:** Age-related declines in sexuality and increase in mental health complications have been well documented. However, whether these two phenomena are related has not been explored. The present study therefore aimed to investigate associations between a decline in sexuality and markers of mental health and wellbeing.

**Method:** Data were collected in 2012/13 from 2614 men and 3217 women participating in the English Longitudinal Study of Ageing, a population-representative panel study of older adults ( $\geq 50$  years). Past-year declines in sexual desire, frequency of sexual activities, and sexual function were self-reported. Three markers of wellbeing (depressive symptoms, quality of life and life satisfaction) were assessed using validated scales. Associations between declines in sexuality and wellbeing were analysed using one-way independent analyses of variance, adjusted for a range of socio-demographic and health-related covariates.

**Results:** Men and women who reported a past-year decline in sexual desire or frequency of sexual activities had a higher number of depressive symptoms (desire  $p = 0.001$ , frequency  $p < 0.001$ ) and lower quality of life (all  $p < 0.001$ ). Decline in sexual desire was also associated with lower life satisfaction in men ( $p = 0.012$ ) and decline in frequency of sexual activities was associated with lower life satisfaction in women ( $p < 0.001$ ). Declines in erectile function in men and ability to become sexually aroused in women were also significantly associated with more depressive symptoms ( $p < 0.001$ ), lower quality of life ( $p < 0.001$ ) and lower life satisfaction ( $p < 0.001$  in men,  $p = 0.024$  in women).

**Conclusion:** Older adults who experience a decline in sexuality report poorer wellbeing than those who do not.

## 1. Background

The World Health Organisation defines sexuality as “a central aspect of being human throughout life [that] encompasses sex, gender identities and roles, sexual orientation, eroticism, pleasure, intimacy and reproduction. Sexuality is experienced and expressed in thoughts, fantasies, desires, beliefs, attitudes, values, behaviours, practices, roles and relationships” (World Health Organization, 2018). Frequency of sexual activity, one component of sexuality, has been shown to be associated with a number of benefits for physical health including greater heart

rate variability (an index that predicts cardiovascular health) and lower risk of certain cancers and fatal coronary events (Ebrahim et al., 2002; Brody and Preut, 2003; Costa and Brody, 2012; Rider et al., 2016; Smith et al., 1997; Lee et al., 2016). Importantly, in a study with a 25-year follow-up, greater frequency of sexual intercourse was associated with a lower annual death rate in men, and enjoyment of intercourse predicted lower mortality among women (Palmore, 1982).

In addition to its physiological benefits, sexuality may also play an important role in maintaining mental health and subjective wellbeing (defined here as peoples' everyday feelings or moods, thoughts about

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the quality of their lives, and overall life satisfaction (Steptoe et al., 2015)). A number of studies have shown that individuals with impaired sexual function are more likely to suffer depression, distress, low relationship satisfaction and reduced quality of life (Mezones-Holguin et al., 2011; Hayes et al., 2008; Kriston et al., 2010; Pastuszak et al., 2013; Syme et al., 2013; Yangin et al., 2008; Mitchell et al., 2012). Other aspects of sexuality, such as sexual desire and the frequency of sexual activities, have been studied to a lesser extent. In a study of 133 older adults (mean age 74 years), both the frequency and importance of sexual behaviours were moderately positively correlated ( $r = 0.52$  and  $0.47$ , respectively, both  $p < 0.001$ ) with quality of life (Flynn and Gow, 2015). In another study in a representative sample of 2810 people in Sweden, the frequency of sexual intercourse was positively associated with sexual satisfaction, health, and wellbeing (Brody and Costa, 2009). With the prevalence of mental health complications on the rise (Lambert, 2006; Adult Psychiatric Morbidity Survey, 2018), understanding the importance of sexuality for mental health and wellbeing may provide a novel target for interventions.

A potential association between sexuality and wellbeing may have particular relevance in later life. As people age, their risk of mental health complications increases (World Health Organization, 2012). This has important implications not only for the mental wellbeing of older adults but also for their physical health. For example, depression in later life is associated with disability, increased mortality, and poorer recovery from physical illness (Rodda et al., 2011). While the risk of mental health complications increases with age, sexuality tends to decline as people get older. In a population-based study of older English adults, sexual activity was found to decrease substantially from 50–59 years to  $\geq 80$  years in both men (94.1–31.1%) and women (53.7–14.2%) (Lambert, 2006). A similar trend and magnitude of decline were also observed in a US population-based study (Lindau et al., 2007). It is possible that this decline in sexuality as people age has a negative influence on wellbeing, thus contributing to the observed rise in mental health complications in older adults. However, to our knowledge, no studies have examined whether a decline in sexual desire, activity and/or function is associated with poorer wellbeing.

The present study therefore aimed to investigate the relationship between declining sexuality and mental health and wellbeing in a representative, population-based sample of older adults. Specifically, we analysed associations between self-reported past-year declines in sexual desire, frequency of sexual activities, ability to have an erection (men) and ability to become sexually aroused (women) and three markers of wellbeing: depressive symptoms, quality of life, and life satisfaction.

## 2. Method

### 2.1. Study population

Data were from the English Longitudinal Study of Ageing (ELSA), a population-representative panel study of men and women aged  $\geq 50$  years living in England (Steptoe et al., 2013). The study started in 2002 (Wave 1), with participants recruited from an annual cross-sectional survey of households and followed up every two years. Data are collected via computer assisted personal interview (CAPI) conducted face to face in the participant's home or residence, with additional self-completion questionnaires returned to the research office by post after the CAPI. The present study uses data from Wave 6 (2012/13) as this is the only wave in which sexual relationships and activities have been assessed. Of the 10,601 individuals who were interviewed in Wave 6 of ELSA, 7079 (67% of those eligible) returned the self-completion Sexual Relationships and Activities Questionnaire (SRA-Q) (Lambert, 2006). We restricted our sample to participants who had data on at least one outcome variable and had complete data on covariates ( $n = 5831$ , 82.4%). All participants gave full informed consent to participate in the study, and ethical approval was obtained from the London Multi-Centre

Research Ethics Committee.

### 2.2. Measures

#### 2.2.1. Decline in sexual activity and function

Participants were asked to indicate whether they had had any sexual activity (defined as sexual intercourse, masturbation, petting or fondling) in the past year (yes/no), and whether, compared with a year ago, they had experienced a change in (i) their sexual drive/desire (all men and women), (ii) the overall frequency of sexual activities (sexually active men and women), and (iii) their ability to have an erection (all men) or become sexually aroused (sexually active women). Response options were on a 5-point scale from “increased a lot” to “decreased a lot”. We dichotomised responses to distinguish between participants reporting a moderate or large decrease in sexual desire, frequency or function from those who reported no change or an increase, as has been done in previous investigations (Lambert, 2006).

#### 2.2.2. Wellbeing

Depressive symptoms were assessed using the 8-item Centre for Epidemiologic Studies Depression (CES-D) scale, a validated scale for use in older adults (Steffick, 2000). The CES-D asks about feelings over the last week (e.g., “Over the last week have you felt sad”), with binary response options (yes/no). Positively-framed items were reverse scored and all items summed to create a total score of 0–8, with higher scores indicating a greater number of depressive symptoms.

Quality of life was assessed using the CASP-19, a validated measure developed specifically to assess quality of life in early old age (Hyde et al., 2003). It contains 19 items on four sub-domains: control, autonomy, pleasure and self-realisation. Respondents indicate their agreement with each statement, for example: “I feel that my life has meaning”, on a 4-point Likert scale from 0 (never) to 3 (often). Total scores ranged from 0 to 57 with higher scores indicating higher quality of life.

Life satisfaction was assessed using the Satisfaction With Life Scale (Diener et al., 1985). This asks respondents to indicate the extent to which they agree with five statements: “In most ways my life is close to my ideal”; “The conditions of my life are excellent”; “I am satisfied with my life”; “So far I have got the important things I want in life”; “If I could live my life again, I would change almost nothing”. Responses were on a Likert scale from 0 (strongly disagree) to 6 (strongly agree), and summed to produce a total score between 0 and 30, with higher scores indicating greater satisfaction with life.

#### 2.2.3. Covariates

All covariates were selected *a priori*. Demographic information collected included age, sex, ethnicity (white vs. non-white) and partnership status (married/cohabiting, separated/divorced, widowed, or single/never married). Socio-economic status (SES) was based on household non-pension wealth (which has been identified as particularly relevant to health outcomes in this age group (Banks et al., 2003)), categorised into quintiles across all Wave 6 ELSA participants.

Health-related questions included current smoking status (smoker or non-smoker) and frequency of alcohol intake, categorised as never/rarely (never – once or twice a year), regularly (once every couple of months – twice a week), or frequently (3 days a week – almost every day) (Lambert, 2006). Physical activity was assessed with three items that asked participants how often they took part in vigorous, moderate and low-intensity activities (more than once a week, once a week, 1–3 times a month, hardly ever/never) (Demakakos et al., 2010). Physical activity was further categorised into three categories for analysis, as previously described (Hamer et al., 2009): inactive (no moderate/vigorous activity on a weekly basis); moderate activity at least once a week; and vigorous activity at least once a week. Limiting long-standing illness was self-reported in response to two questions: (i) “Do you have any long-standing illness, disability, or infirmity? By long-standing I mean

anything that has troubled you over a period of time or that is likely to affect you over a period of time.” If yes, (ii) “Does this illness or disability limit your activities in any way?” Affirmation of a long-standing illness and any form of limitation classified the participant as having a limiting long-standing illness.

### 2.3. Statistical analysis

Analyses were performed using IBM SPSS Statistics 24. Data were weighted to correct for sampling probabilities and for differential non-response and to calibrate back to the 2011 National Census population distributions for age and sex. The weights accounted for the differential probability of being included in Wave 6 of ELSA and for non-response to the SRA-Q. Details can be found at [http://doc.ukdataservice.ac.uk/doc/5050/mrdoc/pdf/5050\\_elsa\\_w6\\_technical\\_report\\_v1.pdf](http://doc.ukdataservice.ac.uk/doc/5050/mrdoc/pdf/5050_elsa_w6_technical_report_v1.pdf).

We used one-way independent analyses of variance (ANOVAs) to test associations between past-year decline in sexual desire, frequency and function and depressive symptoms, quality of life and life satisfaction. All analyses were adjusted for age, partnership status, ethnicity, wealth, smoking status, alcohol intake, physical activity, and limiting long-standing illness. Separate analyses were carried out on men and women, and analyses of declines in frequency of sexual activities and ability to become sexually aroused were restricted to those who reported being sexually active. In order to test whether a decline in sexuality had a greater impact on younger participants, we tested interactions with age. Where the interaction was significant, we repeated the analysis stratified by age group (50–59 60–69,  $\geq 70$  years). In order to examine whether observed associations were confounded by the presence of cardiovascular disease, we performed a post-hoc sensitivity analysis in which models were repeated with additional adjustment for self-reported doctor-diagnosed coronary heart disease. A  $p$ -value  $< 0.05$  was considered statistically significant; we did not adjust for multiple comparisons due to the exploratory nature of the analyses.

### 3. Results

Characteristics of the 2614 men and 3217 women in the sample are summarised in Table 1. Participants had a mean age of 64.8 (SD 9.95) years. The majority were white (94.9%) and married or cohabiting (67.4%). There was a fairly even distribution across wealth quintiles (range 17.4–22% in men, 18.9–21.0% in women). The majority were non-smokers (86.1%), drank alcohol on a regular basis (84.0% of men, 70.3% of women) and were physically active at least once a week (80.2% of men, 74.5% of women).

Around a third of all men (32.3%) and women (33.0%) in the sample reported a decline in sexual desire over the past year. Of those who were sexually active (77.7% of men and 53.7% of women), 36.8% of men and 39.2% of women reported a decline in the frequency of sexual activities. Just over a quarter of participants reported a decline in sexual function, with 26.3% of men experiencing a decline in their ability to have an erection, and 26.6% of women experiencing a decline in their ability to become sexually aroused.

Associations between decline in sexual desire, activity and function and wellbeing are shown in Table 2 (men) and Table 3 (women). Results show that after adjustment for potential confounding by socio-demographic and health-related variables, men and women who reported a past-year decline in sexual desire had a higher number of depressive symptoms ( $p = 0.001$ ) and lower quality of life ( $p < 0.001$ ). Decline in sexual desire was also associated with lower satisfaction with life in men ( $p = 0.012$ ) but not in women ( $p = 0.517$ ). Among participants who reported being sexually active, a decline in the frequency of sexual activities was associated with a greater number of depressive symptoms ( $p < 0.001$ ) and poorer quality of life ( $p < 0.001$ ) in both men and women, and with lower satisfaction with life in women only ( $p < 0.001$ ). Men who reported a decline in their ability to have an erection had less favourable scores across all three measures of mental

**Table 1**  
Sample characteristics.

	Men (n = 2614)	Women (n = 3217)
Age (mean [SD] years)	64.37 (9.78)	65.26 (10.08)
Partner status		
Married/cohabiting	73.6	61.6
Separated/divorced	11.4	15.9
Widowed	6.2	16.8
Single/never married	8.7	5.8
Ethnicity		
White	93.8	96.0
Non-white	6.2	4.0
Wealth quintile		
1 (poorest)	17.4	19.8
2	19.2	20.6
3	19.7	21.0
4	22.0	19.7
5 (richest)	21.7	18.9
Smoking status		
Non-smoker	85.6	86.5
Smoker	14.4	13.5
Alcohol intake <sup>a</sup>		
Never/rarely	16.0	29.7
Regularly	41.9	43.8
Frequently	42.1	26.5
Physical activity		
Inactive	19.8	25.5
Moderately active at least once a week	43.4	48.0
Vigorously active at least once a week	36.8	26.5
Limiting long-standing illness		
No	68.6	64.0
Yes	31.4	36.0
Depressive symptoms (0–8) <sup>b</sup> (mean [SD])	1.13 (1.82)	1.57 (2.01)
IQR	0–1	0–2
Quality of life (0–57) <sup>b</sup> (mean [SD])	40.30 (9.18)	40.36 (9.06)
IQR	34–47	35–47
Life satisfaction (0–30) <sup>b</sup> (mean [SD])	19.97 (6.68)	19.84 (6.68)
IQR	16–25	16–25
Sexually active in the past year	77.7	53.7
Decline in sexual desire	32.3	33.0
Decline in frequency of sexual activities <sup>c</sup>	36.8	39.2
Decline in ability to have an erection	26.3	–
Decline in ability to become sexually aroused <sup>c</sup>	–	26.6

Values are percentages unless otherwise stated.

All figures are weighted for sampling probabilities and differential non-response.

SD = standard deviation; IQR = interquartile range.

<sup>a</sup> Never/rarely = never – once or twice a year; regularly = once every couple of months – twice a week; frequently = 3 days a week – almost every day.

<sup>b</sup> Higher scores represent a greater number of depressive symptoms, greater quality of life, and greater life satisfaction.

<sup>c</sup> Among those who reported any sexual activity in the past year.

health ( $p < 0.001$ ), as did women who reported a decline in their ability to become sexually aroused ( $p < 0.001$  for depressive symptoms and quality of life,  $p = 0.024$  for life satisfaction).

Tests of interactions with age indicated that, on the whole, associations between declines in sexuality and wellbeing differed little by age. The only significant interactions were in men, between decline in frequency of sexual activities and life satisfaction ( $p = 0.037$ ) and decline in ability to have an erection and depressive symptoms ( $p < 0.001$ ). Analyses stratified by age group revealed that the association between decline in frequency of sexual activities and life satisfaction was only significant for participants aged 60–69 ( $F(1,897) = 5.57$ ,  $p = 0.019$ ), with non-significant results observed in those aged 50–59 ( $F(1,977) = 0.56$ ,  $p = 0.455$ ) and  $\geq 70$  years ( $F(1,471) = 2.86$ ,  $p = 0.091$ ). The association between decline in ability to have an erection and depressive symptoms was significant in all age groups, but was stronger among those aged 50–59 ( $F(1,1047) = 34.92$ ,  $p < 0.001$ ) than those aged 60–69 ( $F(1,1064) = 7.12$ ,  $p = 0.008$ )

**Table 2**

Cross-sectional associations in men between past-year decline in sexual desire, frequency of sexual activities, and ability to have an erection and mental health.

	Decline		No decline		Difference	p	Partial eta squared
	n <sup>a</sup>	Mean (95% CI)	n <sup>a</sup>	Mean (95% CI)			
<b>Sexual desire</b>							
Depressive symptoms <sup>b</sup> (0–8)	852	1.23 (1.13–1.33)	1725	1.01 (0.95–1.08)	0.213	0.001	0.004
Quality of life <sup>b</sup> (0–57)	807	39.38 (38.87–39.89)	1676	41.11 (40.76–41.46)	–1.726	< 0.001	0.010
Life satisfaction <sup>b</sup> (0–30)	837	19.72 (19.34–20.10)	1696	20.32 (20.06–20.58)	–0.594	0.012	0.002
<b>Frequency of sexual activities<sup>c</sup></b>							
Depressive symptoms (0–8)	733	1.16 (1.06–1.26)	1241	0.89 (0.81–0.97)	0.266	< 0.001	0.007
Quality of life (0–57)	710	40.38 (39.87–40.89)	1208	42.00 (41.61–42.39)	–1.626	< 0.001	0.010
Life satisfaction (0–30)	725	20.05 (19.66–20.43)	1225	20.47 (20.18–20.77)	–0.427	0.086	0.001
<b>Ability to have an erection</b>							
Depressive symptoms (0–8)	710	1.41 (1.30–1.52)	1860	0.96 (0.89–1.02)	0.452	< 0.001	0.016
Quality of life (0–57)	671	38.91 (38.35–39.48)	1804	41.17 (40.84–41.51)	–2.260	< 0.001	0.015
Life satisfaction (0–30)	695	19.38 (18.97–19.80)	1832	20.43 (20.18–20.68)	–1.045	< 0.001	0.006

CI = confidence interval.

All means are adjusted for age, partnership status, ethnicity, wealth, smoking status, alcohol intake, physical activity and limiting long-standing illness, and weighted for sampling probabilities and differential non-response.

<sup>a</sup> Total sample size (unweighted).<sup>b</sup> Higher scores represent a greater number of depressive symptoms, greater quality of life, and greater life satisfaction.<sup>c</sup> Among those who reported being sexually active.or  $\geq 70$  ( $F(1,920) = 8.44, p = 0.004$ ).

Sensitivity analyses with additional adjustment for history of doctor-diagnosed CHD revealed no change in the pattern of results (data not shown).

#### 4. Discussion

In a large, population-based sample of older adults in England, approximately a third of men and women reported a decline in sexual desire and a similar proportion of those who were sexually active reported a decline in the frequency of sexual activities. Approximately a quarter of participants reported a decline in sexual function; that is a decline in ability to have an erection in men and a decline in the ability to become sexually aroused in women. Men and women who reported a past-year decline in sexual desire or sexual activity had a higher number of depressive symptoms and lower quality of life. Decline in sexual desire was also associated with lower satisfaction with life in men but not in women and a decline in sexual activity was associated with lower satisfaction with life in women but not men. Men who reported a decline in their ability to have an erection had less favourable scores across all three measures of wellbeing, as did women who

reported a decline in their ability to become sexually aroused.

The results show that in older adults there is a decline in a number of attributes relating to sexuality (desire, activity, function). This adds to previous research that shows a decline in sexual activity and desire when people age (Lee et al., 2016; Lindau et al., 2007; Eplöv et al., 2007) and a decline in the ability to achieve an erection (Johannes et al., 2000). Interestingly, the present results indicate that over a quarter of older women experience a decline in sexual arousal. This finding contradicts previous literature that has shown that the prevalence of most sexual difficulties or dysfunctions in women changes little with age (Hayes and Dennerstein, 2005). One possible explanation for these divergent findings may relate to inconsistencies in the way sexual function has been previously measured. Validated scales are infrequently used. Low response rates, limited age ranges, and restrictive inclusion criteria limit the representativeness of many studies and covariates are often not included (Hayes and Dennerstein, 2005). Further research is required in other representative samples using a standardised measure to ascertain whether female sexual arousal does indeed decline with age.

The present study has shown that men and women who report a past-year decline in their sexual desire or the frequency of sexual

**Table 3**

Cross-sectional associations in women between past-year decline in sexual desire, frequency of sexual activities, and ability to become sexually aroused and mental health.

	Decline		No decline		Difference	p	Partial eta squared
	n <sup>a</sup>	Mean (95% CI)	n <sup>a</sup>	Mean (95% CI)			
<b>Sexual desire</b>							
Depressive symptoms <sup>b</sup> (0–8)	1009	1.69 (1.58–1.80)	2185	1.46 (1.38–1.53)	0.233	0.001	0.004
Quality of life <sup>b</sup> (0–57)	940	39.59 (39.11–40.07)	2049	40.97 (40.64–41.31)	–1.385	< 0.001	0.007
Life satisfaction <sup>b</sup> (0–30)	967	19.82 (19.45–20.20)	2130	19.97 (19.72–20.23)	–0.151	0.517	0.000
<b>Frequency of sexual activities<sup>c</sup></b>							
Depressive symptoms (0–8)	665	1.54 (1.42–1.67)	1074	1.17 (1.07–1.27)	0.374	< 0.001	0.011
Quality of life (0–57)	640	40.66 (40.09–42.65)	1021	43.10 (42.65–43.55)	–2.447	< 0.001	0.024
Life satisfaction (0–30)	656	20.12 (19.69–20.56)	1060	21.40 (21.06–21.75)	–1.279	< 0.001	0.011
<b>Ability to become sexually aroused<sup>b</sup></b>							
Depressive symptoms (0–8)	362	1.53 (1.36–1.69)	1005	1.17 (1.07–1.27)	0.356	< 0.001	0.009
Quality of life (0–57)	348	41.05 (40.28–41.82)	968	42.94 (42.48–43.39)	–1.891	< 0.001	0.012
Life satisfaction (0–30)	361	20.41 (19.84–20.99)	992	21.18 (20.84–21.53)	–0.770	0.024	0.003

CI = confidence interval.

All means are adjusted for age, partnership status, ethnicity, wealth, smoking status, alcohol intake, physical activity and limiting long-standing illness, and weighted for sampling probabilities and differential non-response.

<sup>a</sup> Total sample size (unweighted).<sup>b</sup> Higher scores represent a greater number of depressive symptoms, greater quality of life, and greater life satisfaction.<sup>c</sup> Among those who reported being sexually active.

activities tend to have a greater number of depressive symptoms and poorer quality of life. As we adjusted for long-standing conditions and physical activity, our results suggest that the relationships between decline in sexuality and poorer wellbeing exist independently of these other established factors. There are several plausible pathways that may explain these associations. First, endorphins are released during sexual intercourse (activity) which generates a happy or blissful feeling after sex (Rokade, 2011), and it is plausible that experiencing such feelings may result in lower levels of depressive symptoms and better quality of life. Second, having sexual activity may lead to a better relationship with one's partner and thus increased life satisfaction. Finally, engaging in satisfying sexual activity may increase one's self-efficacy and self-esteem which subsequently may result in better mental health. The finding that a decline in sexual desire is associated with poorer wellbeing is interesting. It is likely that a decline in sexual desire leads to a decline in sexual activity and thus a decline in wellbeing. Further longitudinal research is required to test this hypothesis.

The finding that a decline in sexual desire was associated with lower satisfaction with life in men but not in women and a decline in sexual activity was associated with lower satisfaction with life in women but not men should be noted. Feelings of sexual desire have been shown to be greater in men than women (Eplöv et al., 2007). It may be that such feelings in men are related to levels of testosterone. Levels of testosterone have been shown to decline as men age (Morley et al., 1997) and a decline in testosterone level is associated with poorer health outcomes which are likely to be associated with a lower life satisfaction (Laughlin et al., 2008). The finding that sexual activity *per se* was associated with greater life satisfaction in women but not men may be a result of different emotional responses to sexual intercourse between the sexes (Nobre and Pinto-Gouveia, 2006). Further research examining the biomarkers of hormonal factors mediating the relationship between sexuality and wellbeing is required to elucidate the underlying mechanisms.

In both men and women, a decline in sexual function was adversely associated with all measures of wellbeing. This is likely a result of sexual problems leading to a decline in sexual activity and thus a decline in the aforementioned benefits acquired via sexual activity. Moreover, sexual problems such as erectile dysfunction and the ability to become aroused may result in relationship problems that may exacerbate poor mental health.

There was little difference in associations between declines in sexuality and wellbeing by age, indicating that maintaining sexual activity and function remains important throughout later life. The main exception was the association between decline in frequency of sexual activities and life satisfaction, which was only significant in men in their 60s. There is no obvious explanation for this; it could be a spurious finding or there may be an underlying reason that could be clarified through further research. There was also a significant interaction between age and decline in the ability to have an erection in relation to depressive symptoms. Although this association was significant in all age groups, the difference was more pronounced among younger than older men, indicating that the importance of preserving erectile function - at least in terms of maintaining wellbeing - may decline slightly as men get older.

While absolute differences in mean scores on measures of depressive symptoms, quality of life and life satisfaction between participants who did and did not experience a decline in sexuality were small, this is not surprising given the relatively short time period under assessment (one year). It is plausible that declining sexual desire, activity and/or function would continue to have an adverse impact upon wellbeing over time and that greater differences on these measures would be apparent over a longer follow-up. Further research is required to establish the extent to which a decline in sexuality continues to affect wellbeing over the long term.

The present study is the first to investigate associations between declines in sexuality and multiple aspects of wellbeing in older adults.

Strengths include the large sample representative of the over-50s population in England and adjustment for a range of socio-demographic and health-related confounders. However, there were also several limitations. The cross-sectional design precludes any conclusions being drawn regarding the direction of causation, as it is also likely that depressive symptoms and poor quality of life would impede upon sexual desire and function. Indeed, decreased libido is a common symptom of depression (Phillips and Slaughter, 2000). We did not adjust for use of anti-depressants, which can affect both sexual desire and our outcomes of interest. All measures were self-reported which may have introduced reporting bias. However, it was made clear to participants that survey responses would remain anonymous and they were returned in a sealed envelope. Moreover, there is currently little other option to measure the variables investigated in the present study other than by self-report. Complete data were not available for all men and women who took part in Wave 6 of ELSA, and our analysed sample was slightly older and wealthier than those who were excluded, and a higher proportion were white (data not shown). Results may therefore not be fully generalisable to the older English population.

In conclusion, these results demonstrate that a decline in sexuality in older adults is associated with poorer wellbeing. Future research is required to confirm/refute our findings and explore whether asking about and supporting older adults with their sexual activity and relationships could improve their wellbeing.

#### Contributor

SEJ and LS conceived the study. SEJ obtained and analysed the data. SEJ and LS drafted the manuscript. All authors provided critical revision of the manuscript for important intellectual content.

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