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Happiness, rather than depression, is associated with sexual behaviour in partnered older adults

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Abstract

Background: the relation between positive psychological well-being (PPWB) and sexual behaviour is understudied in older adult groups.
Objective: to examine the relation between PPWB (positive affect and life satisfaction) and sexual behaviour (sexual activity and physical tenderness) in older adults, and whether it is independent from depressive symptoms and uniform across older age groups.
Design: cross-sectional.
Setting: community-dwelling adults aged 65 years or older, Rotterdam, The Netherlands.
Methods: sexual behaviour, the Cantril Self-Anchoring Striving Scale, the Center for Epidemiological Studies Depression (CES-D) scale and partner status were assessed in 2,373 dementia-free older adults from the Rotterdam Study.
Results: for partnered participants, greater positive affect and life satisfaction was associated with more sexual activity and physical tenderness. Although CES-D was negatively associated with sexual behaviour within partnered older adults, there was no association between the negative affect sub-scale and sexual behaviour. The relations were independent of depressive symptoms, physical health and chronic disease status and were observed for both sexes at all older ages. For unpartnered participants, greater life satisfaction and was associated with more physical tenderness. There was low prevalence of sexual behaviour in unpartnered participants, limiting further stratification.
Conclusion: greater PPWB was associated with more sexual behaviour in partnered, community-dwelling older adults. We are the first to demonstrate that sexual behaviour is associated with PPWB, rather than lack of depressive symptoms; and that the association was present at all ages for partnered older adults. Limited conclusions can be drawn for unpartnered older adults as their sexual behaviour was infrequent.

Keywords: *positive affect, happiness, depression, sexual behaviour, older persons*

Introduction

Positive psychological well-being (PPWB) has been defined as a pleasurable engagement with the environment, characterised by happiness, joy, excitement, enthusiasm or contentment and is often colloquially referred to as 'happiness' [1]. PPWB is a relatively new field, when compared to the historical mental health approach which has predominantly focused on poor psychological functioning [2], and fits within the 'positive health' paradigm which aims to advance health through wellness rather than the absence of disease [3, 4]. Sexual activity has been identified to contribute to well-being, happiness and

quality of life [4–6]. In fact, sexuality can be regarded as an essential element of human well-being and happiness [4, 7].

Maintenance of PPWB is especially important at older ages when individuals are at greater risk of illness and disability, which are known to impact both mental health and sexual behaviour negatively [3, 8]. Furthermore, the relation between PPWB and sexual behaviour in later life is particularly important as the nature of ageing is changing: we are living longer, are physically and mentally capable for longer and younger generations of older adults are spending more time out of a marital relationship and are engaging in more sexual behaviour [9]. Despite recognition that PPWB is strongly related with sexual behaviour in younger age groups there is limited assessment within older adults [10, 11]. A positive association between PPWB and sexual activity has been observed in nationally representative cross-sectional surveys of Americans aged 44+ years [5, 6] and partnered English aged 50+ years [3]. However, most studies within the field of sexual behaviour tend to recruit younger older adults (aged below 65 years) with only a few participants older than 80 years of age, limiting age-specific implications [3, 5, 6, 12]. Furthermore, as the mechanisms influencing health via PPWB are theorised to be separate and independent to that of depressive symptoms [13, 14], it is important to assess both PPWB and depressive symptoms as having a relation with sexual behaviour. As these current studies did not adjust for depression as a confounder, it is unknown if the association between PPWB and sexual behaviour is merely due to the lack of depressive symptoms.

This paper aims to examine whether there is a relation between PPWB (assessed as positive affect and life satisfaction) and sexual behaviour (assessed as sexual activity and physical tenderness) in a large sample of community-dwelling, older adults aged 65 years or older. If there is a relation between PPWB and sexual behaviour, we will examine whether it is independent from depressive symptoms and uniform across older age groups. Results will be stratified by partner status due to its differential effects upon PPWB [15] and sexual partner availability [6, 16].

Methods

Please refer to Supplement S1, available at *Age and Ageing online* for further methodological details.

Study population

The Rotterdam Study is an ongoing population-based prospective cohort study designed to examine the onset of disease in older adults [17]. This paper is a secondary analysis examining adults who undertook assessments between 2009 and 2012, born between 1913 and 1944 (age: mean 75 + 6SD, range 65–98). Two out of eighteen trained interviewers felt uncomfortable asking the sexual behaviour questions and were excluded from analyses [16]. Of the 2,791 participants who were asked PPWB and sexual behaviour questions, those who answered 'I do not know' for sexual activity questions (n = 36), had incomplete partner status (n = 4), lived in a nursing home (n = 10), were unable to complete a self-reported questionnaire due to low cognitive function (Mini–Mental State Examination score of less than 26, n = 360; had prevalent dementia, n = 4) or did not provide consent for data linkage (n = 3) were excluded. The final sample consisted of 2,374 older adults.

The Rotterdam Study has been approved by the Medical Ethics Committee of the Erasmus Medical Center and by the Ministry of Health, Welfare and Sports, the Netherlands. All participants gave written informed consent.

Sexual behaviour

Being sexually active was defined as answering 'yes' to 'Have you been sexually active in the past 6 months?', with other response options being 'no' or 'I do not know'. Experiencing physical tenderness was defined as answering 'yes' to the previous question or to 'Have you experienced other forms of physical tenderness in the last 6 months (e.g. fondling or kissing)?'. Between partners there is substantial similarity for self-reported sexual behaviour [16].

Positive psychological well-being (PPWB)

Positive and negative affect

The Center for Epidemiological Studies Depression scale (CES-D) is a validated, self-report instrument that measures current depressive symptoms. It consists of 20 items, reported on a four-point scale from 0 (low) to 3 (high) indicating mood and feelings experienced in the past week. Positive affect and negative affect are underlying factors [18] and have previously been examined in the Rotterdam Study [2, 19].

'I am happy' is a single CES-D item.

Life satisfaction

The Cantril Self-Anchoring Striving Scale is a widely used, self-report instrument that measures life evaluation, consisting of one item with responses: 0 (low) to 10 (high).

Partner status

Being partnered was defined as participants self-reporting that they were married or had a partner.

Prevalent disease

Health status was obtained through monitoring events through day-to-day medical records and coded with agreement from two research physicians, including linkage to the national cancer registry and the Dutch pathology database [17]. Cardiovascular disease was defined as stroke, heart failure and coronary heart disease.

Confounders

Potential confounders were selected *a priori* [20] based on either their relation with PPWB or sexual activity. Model 1 adjusted for recruitment cohort, gender, age, educational

level, employment status, social support, living situation, smoking status, alcohol status, Dutch Healthy Diet index and psychiatric medication. Model 2 additionally adjusted for body mass index, Mini–Mental State Examination, general cognitive factor (g-factor) [21], Activities of Daily Living and prevalent chronic disease.

Statistical analysis

Results were stratified by partner status due to its differential effects upon PPWB [15] and sexual partner availability [6, 16]. As the main analysis, the association between PPWB and sexual behaviour was tested with logistic regression analyses. To assess the independent relation between PPWB or negative affect upon sexual behaviour, positive affect and 'I am happy' were adjusted for negative affect. Correspondingly, negative affect was adjusted for positive affect. The first set of sensitivity analyses examined the relation between sexual behaviour with the total CES-D score and PPWB, reverse and/or recoding the items to compare the Odds Ratios to the main analysis. The second set of sensitivity analyses stratified the main analysis by gender and age, and excluded participants who died within 6 months as their health was likely deteriorating, which is associated with decreases in PPWB [8] and sexual behaviour [12]. These sensitivity analyses were only undertaken if more than 10% and more than 10 participants were engaging in sexual behaviour within the category. Analyses were performed using Stata version 13. A *P*-value of less than 0.05 was used to determine statistical significance. On average, 3.5% of confounders were missing after exclusions and were imputed (n = 5) using the *ice* STATA command based on age, sex, education and prior measurements of the confounder of interest.

Results

Partnered compared to non-partnered

When compared to unpartnered participants, partnered participants were more likely to be male, younger, more highly educated, live independently, be less depressed, engage in more sexual behaviour, and have greater social support, PPWB and generally better health (Table 1). Positive affect and negative affect were moderately correlated (r: −0.64, partnered: −0.61, unpartnered: −0.63). Sexual activity and physical tenderness were moderately correlated (r: 0.58, partnered: 0.41, unpartnered: 0.66).

PPWB and sexual behaviour

In the fully adjusted model, PPWB was associated with sexual behaviour (sexual activity and physical tenderness) in partnered participants (Table 2). As positive affect and negative affect were mutually adjusted for each other, the associations with sexual behaviour are independent of each other. The only association observed for unpartnered participants was between greater life satisfaction and more physical tenderness. Lack of CES-D depressive symptoms score was associated with sexual behaviour in partnered participants (see Supplementary Table S2, available at *Age and Ageing* online). 'I am happy' was positively associated with sexual behaviour for partnered participants, which is consistent with the main analysis. When life satisfaction was coded from 0 to 3, the magnitude of effect upon sexual behaviour was slightly higher, but not statistically significantly higher, than the magnitude of effect observed for positive affect in the main analysis.

Sensitivity analyses

The association between PPWB and sexual behaviour in partnered participants were present for both males and females and after exclusion of those who died within 6 months (see Supplementary Table S1, available at *Age and Ageing* online). Due to a reduction in power, no significant association was observed when partnered participants were stratified by age, although, the effect estimates were consistent and not significantly different from the main analysis. Due to the infrequency of sexual behaviour in unpartnered participants, we were unable to stratify further.

Discussion

Greater PPWB (positive affect and life satisfaction) was associated with more sexual behaviour (sexual activity and physical tenderness) in partnered, community-dwelling older adults. This relation was independent of depressive symptoms, physical health and chronic disease status and was observed for partnered males and females at all older ages. Although greater total CES-D depressive symptoms score was associated with less sexual behaviour within partnered older adults, there was no association between the underlying negative affect factor and sexual behaviour. Among unpartnered older adults, greater life satisfaction was associated with more physical tenderness, however, there was a low prevalence of sexual behaviour limiting further stratification.

This is the first study to demonstrate that PPWB is associated with sexual behaviour, rather than lack of depressive symptoms. Similarly to our study, two cross-sectional studies have observed a negative relation between depressive symptoms or depression and sexual behaviour in older adults [5, 22]. In addition, a cross-sectional study demonstrated that sexual well-being could be incorporated into a measure of PPWB for adults aged 18–80 [7] and another cross-sectional study observed that latent groups of older adults with highest sexual activity (intercourse or fondling/petting) had greater PPWB and lack of depressive symptoms when compared to lower sexually active groups [3]. However unlike our study, these studies examined PPWB and/or depressive symptoms independently and did not adjust for the alternate. We illustrate that as there was no association between the negative affect sub-scale and sexual behaviour, the positive association between positive affect and sexual behaviour is likely driving the relation between depressive symptoms and sexual behaviour.

Table 1. Baseline characteristics of the study population (n = 2,373)

	Partnered Mean (SD) or n (Percentage)	Unpartnered Mean (SD) or n (Percentage)	P-value
n	1582	792	
Demographics			
Male gender (versus females)	858 (54.2%)	117 (14.8%)	<0.001
Age (years)	74.0 ± 5.2	78.2 ± 6.6	<0.001
Birth cohort			
<1930	198 (12.5%)	306 (38.7%)	<0.001
1930–1939	859 (54.3%)	362 (45.8%)	
≥1940	525 (33.2%)	123 (15.6%)	
Socioeconomic position			
Education			
Low	253 (16.0%)	207 (26.2%)	<0.001
Intermediate	1023 (64.7%)	502 (63.5%)	
High	306 (19.3%)	82 (10.4%)	
Employed (versus not)	44 (2.8%)	12 (1.5%)	0.06
Social support	9.5 ± 1.2	9.3 ± 1.3	0.03
Living situation			
Independently	1443 (91.2%)	631 (79.7%)	<0.001
Serviced flat	139 (8.8%)	161 (20.4%)	
Health behaviour			
Smoking			
Never	397 (25.1%)	233 (29.5%)	0.2
Past	999 (65.2%)	454 (57.4%)	
Current	189 (11.8%)	104 (13.2%)	
Alcohol			
Never	58 (3.7%)	38 (4.8%)	0.001
Past	167 (10.7%)	116 (14.7%)	
Current	1357 (85.8%)	637 (80.5%)	
Current bicycle rider			
Without effort	904 (57.1%)	247 (31.2%)	<0.001
With difficulty	275 (17.4%)	120 (15.2%)	
No	403 (25.5%)	424 (53.6%)	
Food intake			
Fruit (grams/day)	4.0 ± 3.7	4.4 ± 4.1	0.01
Vegetables (grams/day)	1.9 ± 1.5	1.8 ± 1.6	0.1
Dutch Health eating index (score)	56.4 ± 9.9	56.0 ± 10.9	0.5
Sexual behaviour in the past 6 months			
Sexually active (versus not)	710 (45.3%)	24 (3.2%)	<0.001
Physical tenderness (versus not)	1318 (83.3%)	54 (6.8%)	<0.001
Use of cardiovascular disease medication (versus not)	801 (50.6%)	429 (54.2%)	0.1
Use of psychiatry medication (versus not)	153 (9.7%)	114 (14.4%)	0.001
Mental health			
Positive affect (units/3)	2.7 ± 0.6	2.4 ± 0.7	<0.001
Negative affect (units/3)	0.3 ± 0.4	0.1 ± 0.3	<0.001
Life satisfaction (units/10)	7.9 ± 1.1	7.3 ± 1.3	<0.001
'I am happy' (units/3)	2.6 ± 0.7	2.2 ± 1.0	<0.001
Health status			
Adiposity			
Body mass index (kg/m^2)	27.2 ± 4.0	27.1 ± 4.5	0.5
Blood pressure			
Systolic (mmHg)	152.0 ± 21.1	152.8 ± 21.7	0.4
Diastolic (mmHg)	85.2 ± 11.0	85.0 ± 11.2	0.5
Glucose (mmol/L)	5.8 ± 1.1	5.9 ± 1.2	0.2
Cholesterol (mmol/L)	5.3 ± 1.1	5.6 ± 1.1	<0.001
High density lipoprotein cholesterol (mmol/L)	1.5 ± 0.4	1.6 ± 0.4	<0.001
Mini–Mental State Examination (units)	28.2 ± 1.4	28.0 ± 1.3	0.04
general cognitive factor (units)	0.17 ± 0.97	−0.04 ± 1.02	0.001
Activities of Daily Living (units)	0.4 ± 0.4	0.6 ± 0.5	<0.001
Prevalent cardiovascular disease	776 (49.1%)	395 (49.9%)	0.7

We are the first to demonstrate that in partnered older adults the association between greater PPWB and more sexual behaviour was present at all ages, including a subsample of 215 partnered adults aged 80 years or older. While previous research has demonstrated a possible relation between PPWB and sexual behaviour in older adults,

Table 2. The association between happiness and sexual activity or physical tenderness in the past 6 months

	n	Model 1[a]			Model 2[b]		
		Odds ratio	95% CI	*P*-value	Odds ratio	95% CI	*P*-value
Partnered							
Sexual activity							
Positive affect[c], per average item point (0–3)	1560	1.87	(1.43, 2.45)	<0.001	1.81	(1.38, 2.39)	<0.001
Negative affect[c], per average item point (0–3)	1564	1.15	(0.71, 1.87)	0.6	1.30	(0.79, 2.14)	0.3
Life satisfaction, per average item point (0–10)	1554	1.35	(1.21, 1.51)	<0.001	1.32	(1.18, 1.47)	<0.001
Physical tenderness							
Positive affect[c], per average item point (0–3)	1576	1.52	(1.15, 2.01)	0.003	1.54	(1.16, 2.05)	0.003
Negative affect[c], per average item point (0–3)	1580	0.65	(0.40, 1.05)	0.08	0.64	(0.39 1.04)	0.07
Life satisfaction, per average item point (0–10)	1570	1.44	(1.27, 1.63)	<0.001	1.45	(1.27, 1.64)	<0.001
Unpartnered							
Sexual activity							
Positive affect[c], per average item point (0–3)	786	1.75	(0.62, 4.96)	0.3	1.74	(0.60, 5.06)	0.3
Negative affect[c], per average item point (0–3)	789	1.45	(0.24, 8.67)	0.7	2.02	(0.32, 12.92)	0.5
Life satisfaction, per average item point (0–10)	767	1.46	(0.92, 2.30)	0.1	1.41	(0.88, 2.25)	0.2
Physical tenderness							
Positive affect[c], per average item point (0–3)	787	1.22	(0.67, 2.21)	0.5	1.21	(0.67, 2.21)	0.5
Negative affect[c], per average item point (0–3)	790	0.85	(0.29, 2.52)	0.8	0.95	(0.32, 2.81)	0.9
Life satisfaction, per average item point (0–10)	768	1.35	(1.02, 1.77)	0.03	1.33	(1.01, 1.76)	0.04

[a]Model 1 adjusted for recruitment cohort, gender, age, educational level, employment status, social support, living situation, tobacco smoking status, alcohol status, Dutch Healthy Diet index and psychiatric medication.
[b]Model 2 additionally adjusted for body mass index, Mini–Mental State Examination, g-factor, Activities of Daily Living and prevalent chronic disease (diabetes, cancer or cardiovascular disease).
[c]Positive affect was adjusted for negative affect. Negative affect was adjusted for positive affect.

they often offer study entry to 45+ and 55+ year olds limiting age-specific implications in the oldest old [3, 5, 6, 12]. Furthermore, we demonstrated that patterns between sexual behaviour, PPWB in partnered older adults did not differ by gender or age. Previous research examining adults aged 40+ years has suggested gender differences in the relation between PPWB and sexual behaviour [3, 4, 23], with underlying differentials in relationship characteristics, social cultural context, social support and physical health that may influence both mental health and sexual behaviour. For example, males typically rely primarily on a spouse for health-related support while women receive such support from a larger number of people [24]. We may not have observed a gender difference as we adjusted for a range of potential confounders, including social support, physical health and chronic disease.

This is the first study to assess the relation between PPWB and physical tenderness in older adults and to stratify by partner status. While other studies report that there is an association between greater PPWB with more sexual activity [4, 6] and lower negative affect with physical intimacy [23] in older adults, we observed that these relations were only associated in partnered older adults. Despite having one of the largest samples of older adults [3, 25], within the unpartnered group there was infrequent sexual behaviour, which not only prevented further stratification but may also contribute to the null finding observed between PPWB and sexual behaviour in this group. Key contributors to the different sexual behaviour prevalence rates observed between partnered and unpartnered older adults are theorised to include a lack of healthy sexual partner availability and information bias as partnered adults may feel more comfortable reporting sexual behaviour than unpartnered adults [16]. Furthermore, the fact that unpartnered older adults had lower PPWB scores than partnered older adults may also contribute to the relation between PPWB and sexual behaviour.

As this study is cross-sectional we can only theorise the direction of effect, however we postulate that it is bi-directional (operates in both directions): PPWB influences sexual activity and maintenance of sexual activity is associated with greater PPWB [6, 11, 26]. Sexual behaviour may play important roles in forging connections between partners [11, 23], and thereby increase PPWB. One possible explanation for this link are the range of hormones released during sexual activity and orgasm, including endorphins and oxytocin. Endorphins resemble opiates in their chemical structure and can improve our mood, increase pleasure and minimise pain. Oxytocin has anxiolytic effects and induces feelings of contentment, calmness and security. In addition, variations in levels of other sex-related hormones, such as testosterone, estradiol, follicle-stimulating hormone, luteinising hormone, dehydroepiandrosterone sulfate and prolactin, impact cognition, mood and well-being [27]. Alternatively, PPWB within a relationship may contribute to an active and satisfactory sexual life [10]. In addition, it is known that happier people are perceived as being more attractive [28], potentially increasing sexual behaviour. Furthermore, both PPWB and sexual behaviour are known to decrease with rapidly deteriorating health [8, 29].

Limitations and strengths

Our limitations are common in sexual behaviour research. Firstly, within the unpartnered older adults there was low sexual behaviour engagement and a small sample size for males, limiting further exploration. Secondly, while we incorporated physical tenderness, assessment of additional aspects of sexuality such as masturbation would be of interest. In this study sexual behaviour was left open for interpretation [16]. Thirdly, interviewers, similar to healthcare professionals, may feel uncomfortable asking sexual behaviour questions and we needed to exclude two interviewers [30]. Finally, this study design is cross-sectional and further longitudinal research is required.

Our results are generalisable to community-dwelling older adults. The main strengths include the independent assessment of positive and negative affect and consistency in results. Despite the caution required when assessing single items assessments, we observed that 'I am happy' and life satisfaction displayed similar results to the composite positive affect measure. Additional strengths include the examination within one of the largest samples of older adults [3, 25] who were not recruited explicitly to talk about their sexuality nor were limited by partner status or sexual orientation. Additionally, we adjusted for a variety of confounders including social support, health status and prevalent chronic disease from medical records.

Conclusions

The results from this paper can be utilised by healthcare professionals who provide services for older people as they require an understanding of sexual behaviour and its physiological, practical and psychological implications in the ageing process [11]. Our theory of a bi-directional relations would mean that PPWB maintenance could promote sexual behaviour and, vice-versa that sexual behaviour may help to maintain PPWB. As many health professionals feel uncomfortable or unequipped to discuss sexual health [30], we encourage referral to sexologists. Future research needs to assess the relation between PPWB, sexual behaviour and partner status in older adults longitudinally, as well as, the impact of changes in partner status.

Author contributions

R.F.P., G.D.C.L. and H.T. contributed to the concept and critical interpretation of the data. R.F.P. and H.T. undertook the analysis design. R.F.P. takes responsibility for the integrity of the data, the accuracy of the data analysis and the statistical data analysis. All authors contributed to the final version of the paper and have read, as well as, approved the final manuscript.

Key points

- Greater psychological well-being, rather than lack of depression, was associated with more sexual behaviour in partnered, older adults.
- Sexual activity and physical tenderness were examined in older adults aged 65 years or more.
- The association was present for partnered males and females at all ages, including the 215 adults aged 80+ years.
- Sexual behaviour was infrequent in unpartnered older adults.

Supplementary data

Supplementary data mentioned in the text are available to subscribers in *Age and Ageing* online.

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Conflicts of interest

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