



Body weight and assessment of sexual life – a cross-sectional study

Maciej Białorudzki^{1,A-F}✉, Joanna Mazur^{1,A,C-F}, Józef Haczyński^{1,D-F}, Alicja Kozakiewicz^{1,D-F}, Zbigniew Izdebski^{2,3,A-B,E-F}

¹ Department of Humanization of Health Care and Sexology, Collegium Medicum, University of Zielona Góra, Poland

² Department of Biomedical Aspects of Development and Sexology, Faculty of Education, Warsaw University, Warsaw, Poland

³ Department of Humanization of Health Care and Sexology, Collegium Medicum, University of Zielona Góra, Poland

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Abstract

Introduction and Objective. Body weight can be one of the health effects affecting people's well-being in its many aspects. The aim of the study was to assess the relationship between body weight and sexual life.

Materials and method. In June 2020 a survey was conducted online on a nationwide representative group of 3,000 Poles. A year later, in June 2021 the survey was repeated on a nationwide representative group of 2,500 Poles. The data obtained from 4,266 respondents were then analyzed. Four proprietary questions were used to assess sexual life, based on which a 3-point scale was developed (2020 – $\alpha = 0.80$, homogeneity 61%; 2021 – $\alpha = 0.77$, homogeneity 64%).

Results. Excess body weight as measured by BMI was more common in 2021 than in 2020, which confirms the upward trend in body weight in society (55.5% vs. 52.7%). In 2020, more respondents indicated a good assessment of their sexual life than in 2021 (27.3% vs 23.5%, $p=0.007$). People with excessive body weight rated their sexual life as poorer on the scale (2020 $p=0.003$; 2021 $p=0.009$). Multinomial logistic regression showed that people with obesity (BMI>30) had a 1.7 higher increased risk of poor assessment of sexual life than those with normal weight (OR: 1.728; 95% CI: 1.396–2.138; $p<0.001$). In addition, multinomial logistic regression showed significance for the poor assessment of sexual life for the following factors: age 50–65; female. On the other hand, the following factors were associated with the good assessment of sexual life: age 18–29, being in a relationship, and the year of the study.

Conclusions. Body weight may be one of the most important aspects affecting the assessment of a person's sexual life. Educating patients about the correct body weight is extremely important in order to improve their health and sexual life.

Key words

BMI, body weight, sexuality, sexual health, assessment of sex life

INTRODUCTION

Body Mass Index (BMI) is most often used to assess body weight status in clinical and epidemiological conditions. The incidence of elevated BMI, i.e., values ≥ 25.0 kg/m², indicating overweight and obesity, shows an upward trend in population studies [1, 2]. The difference between the total energy consumed (in kilocalories) and the total energy demand of the body [3] is considered as a determinant of body weight control [3]. Overweight and obesity are defined by the WHO as abnormal or excessive fat accumulation that may impair health [4]. There is evidence that some population groups are potentially at an increased risk of being overweight and obese (e.g., persons of low socioeconomic status, the elderly and those with certain health problems) [5].

Excessive body weight not only affects the dimensions of life quality related to physical and psychosocial health, but also influences other constructs such as body image and sexual health. People with excessive body weight more frequently experience limitations in physical, occupational, and social

functioning [6, 7]. They are also at risk of stigmatization and social isolation due to their condition [8, 9]. Excess body weight also leads to an increased risk of many comorbidities which also affect the quality of life. Excess body weight is associated with diabetes and many types of cancer [10], in addition, it shortens life expectancy by 6 to 14 years [11].

Sexual life as a component of sexuality includes, e.g., sexual behaviour and preferences, as well as subjective assessment of sexual life. According to the WHO, sexual health is:

...a state of physical, emotional, mental and social well-being in relation to sexuality; it is not merely the absence of disease, dysfunction or infirmity. Sexual health requires a positive and respectful approach to sexuality and sexual relationships, as well as the possibility of having pleasurable and safe sexual experiences, free of coercion, discrimination and violence. For sexual health to be attained and maintained, the sexual rights of all persons must be respected, protected and fulfilled [12].

The public health approach to sexuality is restricted to the biological and medical realms, focusing mainly on health outcomes. Such an approach does not consider other aspects of sexuality [13]. When referring to sexual life, attention should be paid not only to the frequency and type of contacts and clinically assessed dysfunctions, but also to the subjective

✉ Address for correspondence: Maciej Białorudzki, Department of Humanization of Health Care and Sexology, Collegium Medicum, Licealna 9, University of Zielona Góra, 65-046 Zielona Góra, Poland
E-mail: mbialorudzki@uz.zgora.pl

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assessment of sexual performance and sexual life, the discrepancy between expectations and their fulfillment, the general level of satisfaction and the quality of sexual life in its various dimensions [14–17].

Sexual functioning is an elementary part of the general health condition of adults with a complex interdependence of social, cultural, relational and biomedical aspects [18]. This intricate and multidimensional process is coordinated by the neurological, endocrine and vascular systems [19]. A lot of problems related to sexual life and functioning depend on mental well-being as well as physical and physiological factors. The following are listed in the context of the negative impact on sexual functioning: relationship problems, psychological issues, such as low self-esteem and disturbed body image; psychiatric problems, such as depression; and medical problems, such as diabetes and excessive body weight [20, 21]. A change of lifestyle, involving modification of the diet, elimination of psychoactive substances, increasing physical activity or reducing excessive body weight, is often the first choice treatment as it is of key importance in sexual health [22].

The relationship between body weight and sexual functioning is neither entirely clear nor understood. Potential mechanisms contributing to the negative impact of increased body weight on sexual functioning are multifactorial. It is suggested that excessive body weight may affect sexual function in a number of ways: on the one hand, it has a direct effect as adipose tissue is an endocrine organ and releases inflammatory cytokines [23]. On the other hand, the impact of comorbidities associated with excess body weight related to sexual health should be considered. The next aspect involves psychological factors related to excessive body weight, such as the fear of one's physical appearance and negative body image, which also affect sexual functioning [24, 25]. The physical limitations are of no lesser importance as they can make sexual activity difficult, painful or even impossible for persons with significant obesity.

The results of research on the occurrence of sexual dysfunctions in respondents with obesity have revealed that about 7–22% of women and 5–21% of men report sexual problems [26]. Persons with excess body weight show reduced frequency of sexual intercourse, decreased sexual drive and lack of perceived sexual satisfaction [27]. Sexual dysfunction in overweight men is more often attributed to biological and physical health factors, while in women, the dysfunction is more often due to the interaction of biological and psychosocial factors [28, 29].

In the light of currently available scientific reports, and to the best of the knowledge of the authors of the current study, there are no studies conducted on a group of adult Poles analyzing body weight and the assessment of sexual life, from the perspective of two population studies carried out by the same team using a standardized methodology. Two large population surveys carried out in two time periods: at the turn of May – June 2020, and at the turn of May – June 2021 allowed assessment of the changes that took place in the course of one year. The advantage of the study is also its wide scope, which enables the comparison of different social groups. It is also important that the research covers the period of the COVID-19 pandemic, which allows comparison of the two stages of the pandemic in the context of sexual health assessment.

The main purpose of the analyses was to present the relationship between current body weight and the assessment

of sexual health. It is worth noting that the subjective measurement of sexual life is an indirect measure of existing sexual dysfunctions.

The article addresses the following research questions:

- 1) Do the questions on the current assessment of sexual life, sexual performance, satisfaction with sexual life, and the assessment of the level of sexual needs, create a homogeneous scale with good psychometric properties?
- 2) How did the average sexual life rating indexes change in 2020–2021?
- 3) Does the BMI significantly affect the variability of the sexual life index after adjusting the analyses for the year of the study, and other social and demographic factors?
- 4) What other social and demographic factors remained significant predictors of the assessment of sexual life in 2020 and 2021?
- 5) Did the assessment of sexual life change between 2020 and 2021, after taking into account its other predictors.

MATERIALS AND METHOD

Study design and sample. Two cross-sectional surveys on the sexual life and sexual health of Poles during the COVID-19 pandemic were examined. Both studies were conducted *ad hoc* by the same researchers by means of a survey on an online panel sample using the Computer Assisted Web Interview (CAWI) method, carried out in June 2020 and a year later in June 2021. The first study evaluated the initial 3 months of the pandemic, and the other its last 12 months. The respondents belonged to a nationwide sample and came from an online panel of a company specializing in research on Polish men and women's health (IQS Sp. z o.o., Warsaw, Poland). Both studies were approved by the Research Ethics Committee of the University of Warsaw (Approval No. 6/2020, 9/2021).

In the two studies, total of 5,500 adult Poles aged 18–87 contributed their responses. Both studies are representative in terms of gender, age and place of life distribution. 4,266 respondents were qualified for further analysis. The lack of sexual initiation, remaining sexually inactive in the last 2–3 months, aged over 65, and incomplete data in the main variables constituted the exclusion criteria. In addition, extreme values of Body Mass Index (BMI) <15 and >60 were also excluded from the analyses.

Survey. Both research tools, the survey questionnaires, contained over 400 variables arranged within 16 thematic blocks in 2020, and 14 blocks in 2021. Some questions were optional, depending on the previous answers of the respondents. A significant part of the questions was retrospective, taking into account the period of the previous 2–3 months in 2020, and the perspective of the last 12 months in 2021. Most of the questions remained unchanged, which ensured the comparability of the data. Survey data collection took about a month in 2020 and about a month in 2021. The questionnaire was designed to take no more than 25 minutes to complete, with some questions and groups of questions being optional, depending on previous responses.

Research tools and measures. To assess sexual life, the following questions were used, which led to the identification of 3 levels of assessment of sexual life: good, average and poor.

- *How would you rate your sexual life in the last 2–3 months?* With 5 response categories ranging from ‘definitely good’ to ‘definitely poor’.
- *How would you rate your sexual performance in the last 2–3 months?* With five response categories ranging from ‘definitely good’ to ‘definitely poor’.
- *How satisfied were you with your sexual life in the last 2–3 months?* With five response categories ranging from ‘very satisfied’ to ‘very dissatisfied’.
- *How do you assess the level of your sexual needs in the last 2–3 months?* With six response categories ranging from ‘very high sexual needs’ to ‘no sexual needs at all’.

Cronbach’s alpha was used to estimate the internal consistency of data on the Pandemic Difficulty Scale (PDS). Cronbach’s alpha values above 0.70 were generally expected to indicate a reliable set of items [30]. The reliability analysis for the 2020 scale was 0.80, while for the 2021 – 0.77. In 2021, the homogeneity of the scale was 64%, while in 2020 – 61%.

Both surveys included a question on the current body weight in kgs and height in cms, which enabled calculation of the BMI value according to the following formula: weight to height squared (kg/m²). For underweight the following BMI was adopted: 18.5–24.99 for normal weight, 25–29.99 for overweight and >30 for obesity.

In addition, demographic and social characteristics were included in the analyses:

- Gender – broken down into men and women.
- Age – divided into 3 categories: 18–29; 30–49; 50 – 65-years-old.
- Education level – converted from 12 categories into 3: below secondary; secondary; higher.
- Relationship status – divided into respondents living in relationships, and single.
- Employment status – active or inactive.

The above questions were formulated in the same way in the 2 research periods.

Statistical analyses. The Cronbach’s alpha index was used to assess the reliability of the sexual life scale. A measure of differences in the strength of sexual health relationship with individual factors was the eta coefficient, estimated with ANOVA. The relationship between the categorized variables was tested using the chi-sq test.

As part of the multivariate analysis, a multinomial logistic regression was estimated with the sexual health scale as the dependent variable, and the average sexual life score assigned as the reference category. The quality of model fit was assessed on the basis of the R-square coefficient. The study assumed a significance level of $p < 0.05$ for all its tests. The analyses were performed using IBM SPSS Statistics v. 28.

MATERIALS AND METHOD

The analyses covered a total of 4,266 respondents, 2,367 in 2020 and 1,899 in 2021, respectively. The research was population-based so that the 2 groups did not differ much in terms of demographic and social variables. The group was gender-balanced (women: 2020 – 50.5%; 2021 – 50.2%). The analyses included respondents up to 65 years of age; the average age in 2020 was 41.8 (SD=13.7), while in 2021 it was

42 (SD=13.2). Most respondents lived in urban areas (2020 – 57.3%; 2021 – 59.5%).

Table 1. Sample characteristics

	REPEATED CROSS-SECTIONAL SURVEYS	
	2020 N= 2,367	2021 N=1,899
Gender		
Male	1171 (49.5%)	946 (49.8%)
Female	1196 (50.5%)	953 (50.2%)
Chi-sq		p=0.823
Age (years)		
18–29.	495 (20.9%)	379 (20.0%)
30–49	1084 (45.8%)	904 (47.6%)
≥50–65	788 (33.3%)	616 (32.4%)
Chi-sq		p=0.487
Level of education		
Lower than secondary	1033 (43.6%)	811 (42.7%)
Secondary	803 (33.9%)	666 (35.1%)
Higher than secondary	531 (22.4%)	422 (22.2%)
Chi-sq		p=0.728
Status of relationship		
Single	518 (21.9%)	432 (22.7%)
Relationship	1849 (78.1%)	1467 (77.3%)
Chi-sq		p=0,500
Employment status		
Yes / hired worker	1385 (60.0%)	1165 (62.8%)
No/ not working	925 (40.0%)	689 (37.2%)
Chi-sq		p=0.058
BMI		
Normal	1120 (47.3%)	846 (44.5%)
Overweight	810 (34.2%)	666 (35.1%)
Obesity	437 (18.5%)	387 (20.4%)
Chi-sq		p=0.137

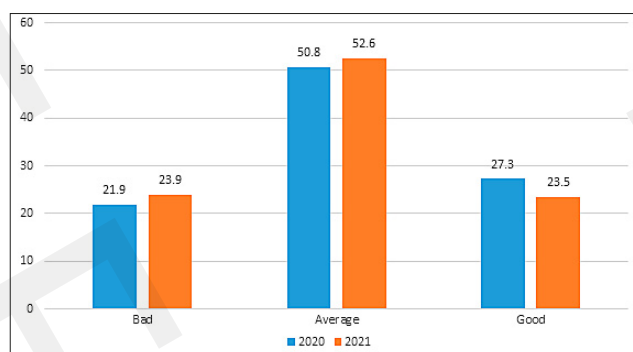


Figure 1. Assessment of sexual life in the 2 studies

Figure 1 shows sexual life assessment categories not based on external criteria. In the 2-year scales, good reliability was obtained in the Cronbach’s alpha test, for 2020 – 0.80 and for 2021 – 0.77, respectively. In 2020, more respondents indicated a good assessment of their sexual life than in 2021 (27.3% vs 23.5%). The results of the Mann-Whitney U test (Chi-sq to compare years of study) showed statistical significance at the level of $p = 0.007$.

Table 2. Average indices of assessment of sex life by socio-demographic characteristics and BMI index (the higher the index, the better assessment of sex life)

	ASSESSMENT OF SEX LIFE	
	2020 N= 2367	2021 N=1899
Total	11.16±3.53	10.90±3.47
Gender		
Male	11.38±3.35	11.02±3.17
Female	10.94±3.68	10.77±3.74
p/eta	0.002/0.004	0.112/0.001
Age		
18–29	11.73±3.57	11.39±3.43
30–49	11.66±3.32	11.30±3.38
50+	10.11±3.55	10.01±3.46
p/eta	<0.001/0.044	<0.001/0.032
Relationship status		
Relationship	11.84±3.24	11.50±3.30
Single	8.73±3.44	8.85±3.24
p/eta	<0.001/0.134	<0.001/0.103
Vocational activity		
Working	11.50±3.40	11.16±3.33
Not working	10.65±3.68	10.41±3.64
p/eta	<0.001/0.014	<0.001/0.011
Education		
Below secondary	11.31±3.66	10.92±3.59
Average	11.16±3.43	11.06±3.36
Higher	10.87±3.41	10.60±3.38
p/eta	0.059/0.002	0.104/0.002
BMI		
Normal	11.26±3.50	11.23±3.42
Overweight	11.24±3.45	10.78±3.39
Obesity	10.78±3.73	10.38±3.65
p/eta	0.041/0.003	<0.001/0.009

Table 2 shows ANOVA averages for the respective variables. The higher the average obtained, the better the assessment of sexual life it indicated. A higher average in the sexual life category was obtained in the first year of the study, i.e., in 2020. In 2020, the greatest discrepancy in the assessment of sexual life was observed in respondents living in a relationship, compared to those who lived alone ($p < 0.001$). Although respondents with a lower BMI in 2020 had a better assessment of sexual life than respondents with overweight and obesity, this difference turned out to be statistically insignificant. A year later, a stronger correlation between BMI and sexual life was observed ($p < 0.001$). In 2021, as in the previous year, the greatest discrepancy in the assessment of sexual life was observed among respondents in a relationship, compared to those who lived alone ($p < 0.001$). Men and younger respondents rated their sex lives better in both surveys ($p < 0.001$).

Table 3 shows the assessment of sexual life of the surveyed according to BMI. Both in 2020 and in 2021, the respondents who had a normal body weight according to BMI most often rated their sexual life as good. People suffering from obesity, on the other hand, assessed their sexual life as poorest. Statistical significance was obtained in 2021 ($p < 0.001$), while

Table 3. Assessment of sex life of the subjects according to BMI

	ASSESSMENT OF SEX LIFE (%)		
	Good	Average	Poor
BMI – 2020			
Normal	29.0	49.4	21.6
Overweight	26.3	54.1	19.6
Obesity	24.7	48.3	27.0
p/eta	0.014/0.052		
BMI – 2021			
Normal	27.3	51.8	20.9
Overweight	20.1	56.8	23.1
Obesity	21.2	47.0	31.8
p/eta	<0.001/0.098		

in 2020 the significance score was on the borderline of values considered significant ($p = 0.014$).

Table 4 shows the results of the multivariate, multinomial logistic regression estimation. The dependent variable is the assessment of sexual life, as the reference category, the average assessment of sexual life was assigned. The explanatory variables were socio-demographic characteristics, BMI, and year of the study. Respondent characteristics found to be insignificant in both models were discarded.

Remaining in a stable relationship turned out to be a significant predictor for a good assessment of sexual life. Age groups 30–49 and 50–65 turned out to significantly lower the good assessment of their sexual life. On the other hand, the presence of obesity, defined as BMI > 30 , aged 50–65, and being a female, were significant for the poor assessment of sexual life. Remaining in a relationship significantly reduced the poor assessment of sexual life among the respondents. A result on the border of statistical significance was obtained for the study as a lower odds factor for the good assessment of sexual life. The occurrence of obesity was a significant predictor of poor sexual life (OR: 1.728; 95% CI 1.396–2.138; $p < 0.001$), compared to normal weight.

DISCUSSION

Surveys on various aspects of sexuality have been carried out in Poland for over 25 years on representative samples of respondents [31, 32]. Such surveys constitute a valuable tool in evaluating the ongoing changes in various aspects of sexuality [17]. The survey conducted twice during the COVID-19 pandemic involved a total of 4,266 adult Poles in 2020 and 2021.

As obesity is an important international public health issue, there are more and more studies and reports on the relationship between excessive body weight and sexual health, and the appearance of dysfunctions in this area. Due to the introduction of restrictions aimed at limiting the spread of the COVID-19 pandemic, changes in social life were implemented that affected the health situation [33]. A number of changes led to adjustments in eating habits and a decrease in physical activity which, in turn, led to an increase in body weight [34, 35]. Moreover, it is suggested that as a result of the outbreak of the pandemic, sexual activity, the number of sexual partners, and the assessment of sexual life deteriorated [36, 37].

The negative impact of excessive body weight on sexual function as a result of metabolic, endocrine or vascular

Table 4. Multinomial logistic regression for changes in the cross-sectional studies for the assessment of sex life

	GOOD ASSESSMENT OF SEX LIFE			P	BAD ASSESSMENT OF SEX LIFE			P
	OR	95% CI(OR)			OR	95% CI(OR)		
		Lower bound	Upper bound			Lower bound	Upper bound	
Constant				<0.001				<0.001
BMI								
25 – 30	0.860	0.723	1.024	0.091	1.030	0.854	1.243	0.755
>30	0.955	0.772	1.181	0.668	1.728	1.396	2.138	<0.001
<25 ref.	1.000				1.000			
Age in years								
30–49	0.606	0.501	0.734	<0.001	0.956	0.761	1.200	0.696
50–65	0.306	0.244	0.383	<0.001	1.547	1.223	1.955	<0.001
18–29 ref.	1.000				1.000			
Gender								
Female	0.999	0.857	1.163	0.985	1.687	1.435	1.982	<0.001
Male ref.	1.000				1.000			
Relationship status								
Relationship	4.027	3.102	5.227	<0.001	0.285	0.239	0.340	<0.001
No ref.	1.000				1.000			
Survey								
2021	0.826	0.710	0.961	0.013	1.057	0.903	1.238	0.491
2020 ref.	1.000				1.000			
R square	Cox and Snell 0.151; Nagelkerke 0.173; McFadden 0.079							

disorders, is a well-known fact [19]. Yet, in women, studies examining the relationship between BMI and sexual dysfunction have shown inconsistent results. This is most likely due to methodological differences, differences in defining sexual dysfunctions, or the inability to directly compare studies as a result of applying heterogeneous measures of sexual function as reported by respondents [38]. Still, some studies suggest that women who are overweight or obese have poorer sexual functions than women of normal weight [39, 40]. When it comes to men, however, studies show that excessive body weight has a negative impact on sexual functioning [25; 41, 42]. In most studies where the respondents were men, it was found that the occurrence of obesity was associated with symptoms of erectile dysfunction, as assessed by the International Index of Erectile Function (IIEF) [43]. In the presented study, overweight and obese respondents showed worse results on the sexual life scale than respondents with normal weight (2020 $p=0.003$; 2021 $p=0.009$). In addition, respondents with excessive body weight made a worse assessment of their sexual life than respondents with normal weight (2020 $p=0.014$; 2021 $p<0.001$). The results of the multinomial logistic regression were statistically significant only in the context of poor assessment of sexual life by respondents with obesity, who had a 1.73 higher risk of poor assessment of sexual life than respondents with normal weight (OR: 1.396–2.138; $p<0.001$). This is consistent with other studies that suggest that sexual function and sexual satisfaction decrease as BMI rises [39; 44, 45].

Excessive body mass and sexual dysfunction in its course may also have a negative impact on self-esteem and perception of one's own body [46]. Ramsey et al. [47] suggest that physical appearance is considered the main factor of sexual attractiveness. Jagstaidt et al. [48] found that dissatisfaction with body image resulting from excessive

body weight is associated with more frequent avoidance of sex; such a relationship was observed more often in women than in men. In the presented research, women rated their sexual life as poorer than men in 2 versions of the study (2020 $p=0.004$; 2021 $p<0.001$). Women also showed a 1.7 times more increased risk of rating their sexual life as worse, than in the case of men (OR: 1.687; 95% CI 1.435–1.982; $p<0.001$). Other studies show that women had a more decreased sexual drive than men [49, 50], and decreased sexual activity [16]. This may be related, among others, to one's own body image, which is listed as one of the main sexual hindrances in Polish women [17], and the increase in sexual dysfunction in women during the COVID-19 pandemic [51]. Other studies also indicate that dissatisfaction with appearance is a predictor of reduced sexual satisfaction in women [25]. This is also associated with decreased sexual function [25], including lower sexual drive, a reduced tendency to achieve orgasm, poorer subjective sexual arousal, and decreased lubrication [52, 53]. All of the above consequently contribute to the assessment of sexual life. In addition, many women were looking after their children and households during the pandemic, which might have contributed to stress and fatigue, which affected the deterioration of the quality of sexual life [54, 55].

Proper sexual functioning is one of the most important elements of the quality of life and maintaining a satisfying intimate relationship [56]. Suitable sexual expression is essential for interpersonal relationships and results in the well-being that potentially contributes to improved subjective health and overall quality of life [57]. The relationship status in this study played a significant role in the context of assessing sexual life. People in a relationship assessed their sexual life as much better than those living alone ($p<0.001$). The results of polynomial multinomial logistic regression showed that respondents in a relationship are 4 times more

likely to assess their sexual life as good (OR: 4.027; 95% CI: 3.102–5.227; $p < 0.001$). Similar results had been obtained in earlier Polish studies [37]. Better assessment of sexual life in respondents in relationships during the COVID-19 pandemic could also result from an increased interest in sexual life to relieve stressful situations related to the pandemic [58].

An important element of the assessment of sexual life is the age of the respondents. Studies indicate that older respondents are at a higher risk of excess body weight and poorer life and sexual health [2]. With age, the number of chronic health problems affecting self-esteem and sexual performance also increases, which would account for the worse satisfaction and assessment of sexual life in comparison with younger respondents [59]. With age, the assessment of sexual life and sexual drive may also be reduced, e.g., by the loss of a partner and the stigmatization of sexuality among the elderly [60]. In the current study, respondents aged 50–65 were 1.6 times more likely to rate their sexual life worse than those aged 18–29 (OR: 1.547; 95% CI 1.223–1.955; $p < 0.001$). This is consistent with other studies that suggest that sexual drive is negatively related to age [17, 61, 62].

Limitations and implications. The study was cross-sectional and therefore causal relationships could not be established. Due to the lack of longitudinal observation, it is impossible to determine the trajectory of changes. The analyses did not take into account the current restrictions and other preventive measures in place during the pandemic, which may have had a significant impact on eating patterns and physical activity, and consequently on body weight. Also, the data on body weight were provided by the respondents, and consequently may be subject to some underestimation. Therefore, information on the distribution of adipose tissue is lacking [63]. The distribution of adipose tissue may serve as a better predictor of health and sexual problems than the mere presence of excess body weight. The effect of the relationship was directed at the impact of body weight on the assessment of sexual life; however, a feedback effect of the assessment of sexual life on body weight and its change can also be expected. As with many aspects of assessing sexual life, it is difficult to determine the impact of excessive body weight on sexual health, excluding comorbidities that also affect sexual life and health.

Further large-scale studies are required, preferably on a longitudinal sample, that could illustrate the cause-effect phenomena better in the context of the impact of body weight on the assessment of sexual life. Such studies should consider the aspects of nutrition and physical activity that constitute the basic strategy to normalize one's body weight. An additional element would be comparison of the longitudinal group, so that the change in body weight and in the assessment of sexual health could be more accurately estimated.

CONCLUSIONS

To the best of the authors' knowledge, this is the first study of this type that was conducted twice among adult Poles. The results obtained contribute to empirical research on body weight and assessment of sexual life. The two studies repeated in Poland in 2020–2021 within a group of respondents aged 18–65 indicate a general deterioration in the assessment of sexual life, and an increase in body weight in the surveyed population. There was a decrease in the percentage of respondents who rated their

sexual life as good, and an increase in the percentage of those who rated their sexual life as poor. The results indicate a worse assessment of sexual life in respondents who are overweight, live alone, aged 50–65, and in women. In the future, projects related to body weight, one's image as related to body weight, as well as educational programmes related to sexual life should be implemented. The obtained results can be used to further monitor changes in body weight and assessment of sexual life. It is necessary to implement simple surveys assessing satisfaction with sexual life and the level of sexual needs. The questions used in the survey constitute an acceptable and homogeneous scale with good psychometric properties, and could be recommended as a simple screening tool to assess the level of satisfaction with sexual life.

REFERENCES

- Dai H, Alsalhe TA, Chalghaf N, Riccò M, Bragazzi NL, Wu J. The global burden of disease attributable to high body mass index in 195 countries and territories, 1990–2017: An analysis of the Global Burden of Disease Study. *PLoS Med.* 2020;17(7):e1003198. doi:10.1371/journal.pmed.1003198
- Jaacks LM, Vandevijvere S, Pan A, et al. The obesity transition: stages of the global epidemic. *Lancet Diabetes Endocrinol.* 2019;7(3):231–240. doi:10.1016/S2213-8587(19)30026-9
- Blomain ES, Dirhan DA, Valentino MA, Kim GW, Waldman SA. Mechanisms of Weight Regain following Weight Loss. *ISRN Obes.* 2013;2013:210524. doi:10.1155/2013/210524
- World Health Organization: Obesity and overweight. <https://www.who.int/news-room/fact-sheets/detail/obesity-and-overweight> (access: 2023.06.28).
- Mayo Clinic. Obesity: Symptoms and Causes. <https://www.mayoclinic.org/diseases-conditions/obesity/symptoms-causes/syc-20375742> (access: 2023.06.28).
- Truthmann J, Mensink GBM, Bösy-Westphal A, Hapke U, Scheidt-Nave C, Schienkiewitz A. Physical health-related quality of life in relation to metabolic health and obesity among men and women in Germany. *Health Qual Life Outcomes.* 2017;15(1):122. doi:10.1186/s12955-017-0688-7
- Ng LH, Hart M, Dingle SE, et al. Prospective associations between diet quality and health-related quality of life in the Australian Diabetes, Obesity and Lifestyle (AusDiab) study. *Br J Nutr.* 2023;130(1):83–92. doi:10.1017/S000711452200304X
- Jung FU, Luck-Sikorski C. Overweight and Lonely? A Representative Study on Loneliness in Obese People and Its Determinants. *Obes Facts.* 2019;12(4):440–447. doi:10.1159/000500095
- Hunger JM, Major B, Blodorn A, Miller CT. Weighed down by stigma: How weight-based social identity threat contributes to weight gain and poor health. *Soc Personal Psychol Compass.* 2015;9(6):255–268. doi:10.1111/spc3.12172
- Scully T, Ettela A, LeRoith D, Gallagher EJ. Obesity, Type 2 Diabetes, and Cancer Risk. *Front Oncol.* 2020;10:615375. doi:10.3389/fonc.2020.615375
- Kitahara CM, Flint AJ, Berrington de Gonzalez A, et al. Association between class III obesity (BMI of 40–59 kg/m²) and mortality: a pooled analysis of 20 prospective studies. *PLoS Med.* 2014;11(7):e1001673. doi:10.1371/journal.pmed.1001673
- World Health Organization. Sexual health. <https://www.who.int/health-topics/sexual-health> (access: 2023.06.28).
- Epstein S, Mamo L. The proliferation of sexual health: Diverse social problems and the legitimization of sexuality. *Soc Sci Med.* 2017;188:176–190. doi:10.1016/j.socscimed.2017.06.033
- Mollaioli D, Sansone A, Ciocca G, et al. Benefits of Sexual Activity on Psychological, Relational, and Sexual Health During the COVID-19 Breakout. *J Sex Med.* 2021;18(1):35–49. doi:10.1016/j.jsxm.2020.10.008
- Michielsen K, Larrson EC, Kägesten A, et al. International Sexual Health And REproductive health (I-SHARE) survey during COVID-19: study protocol for online national surveys and global comparative analyses. *Sex Transm Infect.* 2021;97(2):88–92. doi:10.1136/sextrans-2020-054664
- Masoudi M, Maasoumi R, Bragazzi NL. Effects of the COVID-19 pandemic on sexual functioning and activity: a systematic review and meta-analysis. *BMC Public Health.* 2022;22(1):189. doi:10.1186/s12889-021-12390-4

17. Izdebski Z, Słowikowska-Hilczler J, Mazur J. The Effect of the COVID-19 Pandemic on the Assessment of Sexual Life-Repeated Cross-Sectional Surveys among Polish Adults in 2017, 2020 and 2021. *Int J Environ Res Public Health*. 2022;19(7). doi:10.3390/ijerph19074110
18. Jannini EA, Limoncin E, Ciocca G, Buehler S, Krychman M. Ethical aspects of sexual medicine. Internet, vibrators, and other sex aids: toys or therapeutic instruments? *J Sex Med*. 2012;9(12):2994–3001. doi:10.1111/jsm.12018
19. Jannini EA. SM = SM: The Interface of Systems Medicine and Sexual Medicine for Facing Non-Communicable Diseases in a Gender-Dependent Manner. *Sex Med Rev*. 2017;5(3):349–364. doi:10.1016/j.sxmr.2017.04.002
20. Białorudzki M. Sex and dietetics. What do dietetics and sexology have in common? In: Kowalewska A, Waz K, Białorudzki M, editors. *Od seksualności do humanizacji medycyny. Benefis Zbigniewa Izdebskiego słowem pisany*. Warsaw: Wydawnictwo Uniwersytetu Warszawskiego; 2022. p. 155–165.
21. Mollaioli D, Ciocca G, Limoncin E, et al. Lifestyles and sexuality in men and women: the gender perspective in sexual medicine. *Reprod Biol Endocrinol*. 2020;18(1):10. doi:10.1186/s12958-019-0557-9
22. Corona G, Ricca V, Bandini E, et al. SIEDY scale 3, a new instrument to detect psychological component in subjects with erectile dysfunction. *J Sex Med*. 2012;9(8):2017–26. doi:10.1111/j.1743-6109.2012.02762.x
23. Harvey I, Boudreau A, Stephens JM. Adipose tissue in health and disease. *Open Biol*. 2020;10(12):200291. doi:10.1098/rsob.200291
24. Rowland DL, McNabney SM, Mann AR. Sexual Function, Obesity, and Weight Loss in Men and Women. *Sex Med Rev*. 2017;5(3):323–338. doi:10.1016/j.sxmr.2017.03.006
25. Sarwer DB, Steffen KJ. Quality of Life, Body Image and Sexual Functioning in Bariatric Surgery Patients. *Eur Eat Disord Rev*. 2015;23(6):504–8. doi:10.1002/erv.2412
26. Limoncin E, Ciocca G, Mollaioli D, Jannini EA. Sexual distress in obesity. In: Lenzi A, Migliaccio S, Donini L, editors. *Multidisciplinary approach to obesity*. Cham: Springer International Publishing; 2015. pp. 145–153.
27. Larsen SH, Wagner G, Heitmann BL. Sexual function and obesity. *Int J Obes (Lond)*. 2007;31(8):1189–98. doi:10.1038/sj.ijo.0803604
28. Rowland DL, McNabney SM, Mann AR. Sexual Function, Obesity, and Weight Loss in Men and Women. *Sex Med Rev*. 2017;5(3):323–338. doi:10.1016/j.sxmr.2017.03.006
29. Bates JN, Pastuszak AW, Khera M. Effect of Body Weight on Sexual Function in Men and Women. *Curr Sex Health Rep*. 2019;11(1):52–59.
30. Cain MK, Zhang Z, Yuan KH. Univariate and multivariate skewness and kurtosis for measuring nonnormality: Prevalence, influence and estimation. *Behav Res Methods*. 2017;49(5):1716–1735. doi:10.3758/s13428-016-0814-1
31. Izdebski Z. Health and Sexual Life of Poles in 2017. Research Study in the Background since 1997. Warsaw: Wydawnictwo Uniwersytetu Warszawskiego; 2020.
32. Izdebski Z. Sexuality of Poles at the Beginning of the 21st Century. A research study. Cracow: Wydawnictwo Uniwersytetu Jagiellońskiego; 2012.
33. Han E, Tan MMJ, Turk E, et al. Lessons learnt from easing COVID-19 restrictions: an analysis of countries and regions in Asia Pacific and Europe. *Lancet*. 2020;396(10261):1525–1534. doi:10.1016/S0140-6736(20)32007-9
34. Khubchandani J, Price JH, Sharma S, Wiblehauser MJ, Webb FJ. COVID-19 pandemic and weight gain in American adults: A nationwide population-based study. *Diabetes Metab Syndr*. 2022;16(1):102392. doi:10.1016/j.dsx.2022.102392
35. Vogel M, Geserick M, Gausche R, et al. Age- and weight group-specific weight gain patterns in children and adolescents during the 15 years before and during the COVID-19 pandemic. *Int J Obes (Lond)*. 2022;46(1):144–152. doi:10.1038/s41366-021-00968-2
36. Li W, Li G, Xin C, Wang Y, Yang S. Challenges in the Practice of Sexual Medicine in the Time of COVID-19 in China. *J Sex Med*. 2020;17(7):1225–1228. doi:10.1016/j.jsxm.2020.04.380
37. Białorudzki M, Izdebski Z. Changes in the body mass of adult residents of rural and urban areas in the initial months of the COVID-19 pandemic vs. their mental, physical and sexual health. *Ann Agric Environ Med*. 2021;28(4):667–675. doi:10.26444/aaem/143561
38. Faubion SS, Fairbanks F, Kuhle CL, et al. Association Between Body Mass Index and Female Sexual Dysfunction: A Cross-sectional Study from the Data Registry on Experiences of Aging, Menopause, and Sexuality. *J Sex Med*. 2020;17(10):1971–1980. doi:10.1016/j.jsxm.2020.07.004
39. Ferrández Infante A, Novella Arribas B, Khan KS, et al. Obesity and female sexual dysfunctions: A systematic review of prevalence with meta-analysis. *Semergen*. 2023;49(7):102022. doi:10.1016/j.semgerg.2023.102022
40. Towe M, La J, El-Khatib F, Roberts N, Yafi FA, Rubin R. Diet and Female Sexual Health. *Sex Med Rev*. 2020;8(2):256–264. doi:10.1016/j.sxmr.2019.08.004
41. Pierzak M, Gluszek S. The effect of weight reduction on the sexual function and reproductive health of obese men. *Medical Studies/Studia Medyczne*. 2022;38(3):233–244. doi:10.5114/ms.2022.119923
42. Moore RH, Sarwer DB, Lavenberg JA, et al. Relationship between sexual function and quality of life in obese persons seeking weight reduction. *Obesity (Silver Spring)*. 2013;21(10):1966–74. doi:10.1002/oby.20398
43. Kessler A, Sollie S, Challacombe B, Briggs K, Van Hemelrijck M. The global prevalence of erectile dysfunction: a review. *BJU Int*. 2019;124(4):587–599. doi:10.1111/bju.14813
44. Milhausen RR, Buchholz AC, Opperman EA, Benson LE. Relationships Between Body Image, Body Composition, Sexual Functioning, and Sexual Satisfaction Among Heterosexual Young Adults. *Arch Sex Behav*. 2015;44(6):1621–33. doi:10.1007/s10508-014-0328-9
45. Salari N, Hasheminezhad R, Sedighi T, Zarei H, Shohaimi S, Mohammadi M. The global prevalence of sexual dysfunction in obese and overweight women: a systematic review and meta-analysis. *BMC Womens Health*. 2023;23(1):375. doi:10.1186/s12905-023-02544-4
46. Esfahani SB, Pal S. Obesity, mental health, and sexual dysfunction: A critical review. *Health Psychol Open*. 2018;5(2):2055102918786867. doi:10.1177/2055102918786867
47. Ramsey LR, Marotta JA, Hoyt T. Sexualized, objectified, but not satisfied: Enjoying sexualization relates to lower relationship satisfaction through perceived partner-objectification. *J Soc Pers Relat*. 2017;34(2), 258 278. doi:10.1177/0265407516631157
48. Jagstaidt V, Golay A, Pasini W. Relationships between sexuality and obesity in male patients. *New Trends Exp Clin Psychiatry* 1997;13:105–110.
49. Kim JJ, Muise A, Barranti M, Mark KP, Rosen NO, Harasymchuk C, Impett E. Are Couples More Satisfied When They Match in Sexual Desire? New Insights From Response Surface Analyses. *Soc Psychol Pers Sci*. 2021;12(4):487–496. doi:10.1177/1948550620926770
50. Sutherland SE, Rehman US, Fallis EE, Goodnight JA. Understanding the phenomenon of sexual desire discrepancy in couples. *Can J Hum Sex*. 2015;24(2):141–150. doi:10.3138/cjhs.242.A3
51. Fuchs A, Matonóg A, Pilarska J, et al. The Impact of COVID-19 on Female Sexual Health. *Int J Environ Res Public Health*. 2020;17(19) doi:10.3390/ijerph171917152
52. Pauls RN, Occhino JA, Dryfhout VL. Effects of pregnancy on female sexual function and body image: a prospective study. *J Sex Med*. 2008;5(8):1915–22. doi:10.1111/j.1743-6109.2008.00884.x
53. Seal BN, Bradford A, Meston CM. The association between body esteem and sexual desire among college women. *Arch Sex Behav*. 2009;38(5):866–72. doi:10.1007/s10508-008-9467-1
54. Sanchez DT, Kiefer AK. Body concerns in and out of the bedroom: implications for sexual pleasure and problems. *Arch Sex Behav*. 2007;36(6):808–20. doi:10.1007/s10508-007-9205-0
55. Hamilton LD, Meston CM. Chronic stress and sexual function in women. *J Sex Med*. 2013;10(10):2443–54. doi:10.1111/jsm.12249
56. Wang C, Pan R, Wan X, et al. Immediate Psychological Responses and Associated Factors during the Initial Stage of the 2019 Coronavirus Disease (COVID-19) Epidemic among the General Population in China. *Int J Environ Res Public Health*. 2020;17(5). doi:10.3390/ijerph17051729
57. Rosen RC, Bachmann GA. Sexual well-being, happiness, and satisfaction, in women: the case for a new conceptual paradigm. *J Sex Marital Ther*. 2008;34(4):291–7; discussion 298–307. doi:10.1080/00926230802096234
58. Ballester-Arnal R, Nebot-García JE, Ruiz-Palomino E, Giménez-García C, Gil-Llario MD. “INSIDE” Project on Sexual Health in Spain: Sexual Life During the Lockdown Caused by COVID-19. *Sex Res Social Policy*. 2021;18(4):1023–1041. doi:10.1007/s13178-020-00506-1
59. Lee DM, Nazroo J, O’Connor DB, Blake M, Pendleton N. Sexual Health and Well-being Among Older Men and Women in England: Findings from the English Longitudinal Study of Ageing. *Arch Sex Behav*. 2016;45(1):133–44. doi:10.1007/s10508-014-0465-1
60. Izdebski Z. Sexual health and life of Poles aged 50–74 in 2017. A perspective of ageing society. Warsaw: Wydawnictwo Uniwersytetu Warszawskiego; 2021.
61. Buczak-Stec E, König HH, Hajek A. Sexual satisfaction of middle-aged and older adults: longitudinal findings from a nationally representative sample. *Age Ageing*. 2021;50(2):559–564. doi:10.1093/ageing/afaa161
62. Estill A, Mock SE, Schryer E, Eibach RP. The Effects of Subjective Age and Aging Attitudes on Mid- to Late-Life Sexuality. *J Sex Res*. 2018;55(2):146–151. doi:10.1080/00224499.2017.1293603
63. Traczyk I, Kucharska A, Sińska BI, et al. Every second adult inhabitant of Poland (aged 18–64) is overweight – results of representative cross-sectional studies conducted in 2017–2020. *Ann Agric Environ Med*. 2023;30(2):322–330. doi:10.26444/aaem/165913.