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Research Report

Development of a Screening Tool for Assessing Sexual Difficulties Among Patients with Parkinson's Disease: The PD-SDS

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Abstract.
Background: People with Parkinson's disease (PwPD) exhibit various sexual difficulties (SDs) that may be due to motor and/or nonmotor symptoms or the use of antiparkinsonian medication. SDs are often underreported by PwPD and underexplored by physicians.
Objective: This study aimed to explore the SDs experienced by PwPD and create a scale for assessing them.
Methods: A corpus of items was generated from semistructured interviews to represent the experience of PwPD as closely as possible. The number of items was reduced according to the psychometric properties, and the scale's structure was subsequently examined. The final phase consisted of measuring the scale's validity and reliability.
Results: After assessment of the original corpus of 59 items by PwPD and clinicians, a 25-item version was obtained. The analysis of item properties led to the removal of fifteen items. An exploratory factor analysis of the first 10-item version with a first PwPD sample identified four components of the SDs among PwPD: "low sexual esteem," "sexual displeasure," "impact on sexual position" and "hypersexuality." With a second PwPD sample, a confirmatory factor analysis demonstrated a satisfactory fit between the model with four components and the data. The 10-item scale had good internal consistency and good temporal reliability.
Conclusions: The Parkinson's Disease Sexual Difficulties Scale (PD-SDS) is a valid screening tool that facilitates the investigation of and communication about PD-related SDs. It is intended to improve the identification of vulnerable PwPD and to target the domain of sexual experience impacted by PD to better support PwPD.

Keywords: Parkinson's disease, sexual difficulties, screening tool, scale

INTRODUCTION

Parkinson's disease (PD) represents the second most prevalent neurodegenerative disease worldwide after Alzheimer's disease [1], with approximately

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10 million people diagnosed. PD is characterized by the loss of dopaminergic neurons in the substantia nigra, resulting in a set of heterogeneous motor (bradykinesia, rest tremor, rigidity and postural instability) [2] and nonmotor symptoms (cognitive impairment, neuropsychiatric disorders, sleep disorders, sensory disturbances, and autonomic dysfunction) [3]. Although less explored and often untreated, nonmotor symptoms have a serious impact on the quality of life of people with PD (PwPD) [4], even more so than motor symptoms [5].

Among the nonmotor symptoms, sexual dysfunction is common in PwPD, with an estimated prevalence ranging from 36% to 87.5%, which is higher than that reported in a control sample [6]. PwPD may experience various sexual disorders [7], such as hypoactive sexual desire; decreased sexual arousal; painful intercourse; difficulty reaching orgasm or orgasmic dissatisfaction, particularly in women with PD [8–10]; and sexual dissatisfaction, particularly in men with PD [11, 12]. Women with PD may experience reduced vaginal lubrication [7, 8, 13], whereas men with PD may suffer from erectile dysfunction and premature or delayed ejaculation [11, 14].

Several factors contribute to sexual disorders in PwPD. PD motor symptoms, such as rigidity, tremor, immobility in bed or decreased fine movements, may constrain the ability to intimately caress a partner, which is essential for sexual pleasure and arousal, and may lead to role changes in sexual activity (active to passive), a limited choice of sexual positions or the need to plan intercourse [7, 15]. Furthermore, physical changes caused by PD can impact the esteem and body image of PwPD, which may reinforce sexual disorders [11] and can also reduce the sexual attraction of partners [16]. Nonmotor symptoms, such as anxiety and depression, are associated with decreased sexual desire and arousal [13, 17]. Due to sleep disturbances, partners may adopt bed separation, which reduces the chance of initiating intimate contact [15]. Finally, PwPD may worry that urinary incontinence will occur during intercourse, which reduces sexual arousal, inhibits orgasm [15], and decreases sexual satisfaction [18]. Through physiological and hormonal changes, such as changes due to menopause or prostate dysfunctions, ageing may play a role in sexual dysfunction in PwPD [19]. Finally, due to the use of dopamine replacement therapy, especially dopamine agonists, PwPD may develop compulsive sexual disorders, also called hypersexuality, including compulsive masturbation, compulsive use of pornography, excessive sexual demands and an increased number of sexual partners [20]. Hypersexuality affects a smaller proportion of PwPD, with a 2.7% lifetime prevalence, and is associated with an early onset of PD, a history of behavioural symptoms prior to dopamine agonist use, and male sex [20].

PD-related sexual disorders can lead to decreased intercourse frequency [10, 14] or even the cessation of intercourse [11], withdrawal from sex, increased thoughts of separation, and conflict between partners [7, 10, 15].

Due to modesty or embarrassment, sexual difficulties are rarely reported by PwPD, especially women [16, 21]. Additionally, they are not systematically screened by physicians, particularly for women with PD, due to lack of time, advanced age of PwPD and because few PwPD complain about their sexual health [22, 23]. Since sexual disorders play a major role in the deterioration of the quality of life of PwPD and their partners [12, 24, 25], physicians should systematically evaluate the sexual well-being of their patients [17]. Given that intimacy is difficult to discuss, questionnaires specifically assessing PD-related sexual experience could facilitate further investigations and patient–physician communication about sexual disorders [14]. Indeed, there is no adjusted tool designed for the evaluation of the variety of sexual problems that can be encountered by PwPD [14, 15]. The presence or absence of sexual dysfunction is assessed in a very general way with only one or two items in scales dedicated to the evaluation of nonmotor symptoms (Non-Motor Symptoms Scale [26], Non-motor Symptoms Questionnaire [27], Movement Disorder Society-sponsored Revision of the Unified Parkinson's Disease Rating Scale—MDS-UPDRS [28], Scales for Outcomes in Parkinson's disease—Autonomic Dysfunction [29]) or quality of life in PD (Parkinson's Disease Quality of Life [30], Parkinson's Impact Scale [31]).

Therefore, the first aim of this study was to determine the different aspects of sexual difficulties specifically encountered by PwPD. The second aim was to develop a scale based on patients' own words intended to detect and evaluate these PwPD's sexual difficulties and to examine its psychometric qualities. The study was conducted in three phases following previous recommendations [32, 33]: generation of the item corpus, exploration of the scale's structure, and examination of the psychometric properties of the final version of the scale

(validity and reliability). This study was approved by the Local Ethics Committee of the University of Lille (n°2020-411-S81) and was conducted in accordance with the principles of the Helsinki Declaration.

PHASE 1: GENERATION OF THE CORPUS OF ITEMS

A qualitative study was conducted to develop items that represented the sexual experience of PwPD as closely as possible and to "avoid imposing preconceived theoretical restrictions" [32]. In the first step, 10 men and 4 women with PD according to the diagnostic criteria of the Movement Disorder Society who expressed a sexual complaint were interviewed by a clinical psychologist at the PD Expert Center of Lille Hospital. The PwPD were asked about the impact of PD on their sexual life; the sexual difficulties they encountered and their progression since the beginning of the disease; and finally, about the impact of PD on their emotional experiences, their relationship with their partner and the coping strategies they used. The interviews were recorded and transcribed. To develop a set of items, excerpts relating to the sexual life of PwPD were selected to capture as much as possible their experiences expressed in their own words. These excerpts were partially adapted to fit the item format of the questionnaire, and redundant items were eliminated. At this stage, we obtained a corpus of 59 items.

In the second stage, four PwPD and six clinicians working with PwPD assessed each item for its specificity to PD, unambiguity, ease of understanding and relevance for clinical practice. This evaluation enabled us to remove 34 items to obtain the initial 25-item version of the scale. Finally, we added the following instructions: It is recognized that the motor and nonmotor symptoms of PD (slowness of movement, rigidity, muscle stiffness, tremor, numbness, fatigue, pain, etc.) and the side effects of certain medications can cause alterations in the sexual functioning. When we refer to "symptoms", we are referring to the motor and nonmotor symptoms of PD. For each of the following statements, indicate how closely it matches what you have felt or experienced recently using a 4-point Likert scale ("this does not correspond to me at all", "this corresponds to me a little", "this corresponds to me quite well", "this corresponds to me completely").

PHASE 2: EXPLORATION OF THE SCALE'S STRUCTURE

Methods

Participants and procedure

The sample included 140 PwPD, 115 of whom were recruited from the internet (social networks dedicated to PD) and 25 from outpatients at the Lille University Medical Center. The inclusion criteria were being diagnosed with PD and receiving stable antiparkinsonian medication for at least one month.

Demographic and clinical variables

Sex, age, and conjugal status were recorded as well as the year of diagnosis. Nonmotor and motor aspects of experiences of daily living were assessed by PwPD with parts 1 and 2 of the MDS-UPDRS, respectively [28]. Participants also reported the number of intercourse sessions during the previous month and completed the 25-item scale.

Statistical analysis

Analyses were carried out in accordance with previous recommendations [33, 34]. The skewness and kurtosis of the data distributions were calculated. Scale items with an excessively flat, asymmetrical and/or poorly dispersed distribution (skewness and kurtosis equal to or greater than 1.5 in absolute value) were eliminated. Interitem Pearson correlations were computed, and highly correlated items ($r > 0.65$) were eliminated.

Thereafter, a principal component analysis was carried out. To estimate the optimal number of components to retain, we combined the screening test [35] and the Kaiser–Guttman criterion [36] to pick the elbow of the curve and identify components with an eigenvalue above 1, respectively. Then, to determine the representativeness of the components, we conducted a varimax rotation to yield the number of nonnegligible loadings and the factorial structure with relatively independent constructs [37]. The number of cases of double loadings was reduced by accepting those with the highest loading higher than 0.30 and for which the difference between the highest loading and the other loading was greater than 0.20. Semantic analyses were ultimately performed to check the interpretability of each component and the conceptual coherence of each item in its component.

Results

Participants

Among the 140 participants, 40.71% were women and 59.29% were men, with an average age of 60.69 years (SD = 9.46); 86.43% had a partner, and the mean number of intercourse sessions during the last month was 4.42 (SD = 5.56). Participants had been diagnosed for an average of 8.19 years (SD = 5.88), and they obtained a mean score of 11.76 for the motor subscale of the MDS-UPDRS (SD = 7.44) and a mean score of 10.09 for the nonmotor subscale of the MDS-UPDRS (SD = 4.48).

Item properties and multidimensional results

Three items with skewness and kurtosis values higher than |1.5| were removed. The item correlation matrix revealed fourteen pairs of items with correlation coefficients greater than 0.65. We semantically analyzed these intercorrelated pairs to retain nonredundant and clinically significant items and eliminated the other twelve pairs.

There were 5 components before the elbow of the eigenvalue curve (scree test) with an eigenvalue above 1 (Kaiser criterion). After iteratively examining all of the component solutions with a varimax rotation and eliminating items that did not meet the selection criteria, we obtained a 10-item version of the scale. These items were organized into four components that explained 75.64% of the total variance. The first 3-item component, titled "low sexual esteem", explained 28.89% of the variance and was associated with low sexual self-esteem and low confidence in the capacity of PwPD to experience sexuality and to satisfy their partner. The internal consistency value for this component was 0.79. The second component, "hypersexuality", refers to an increase in sexual activity and desire compared to their usual sexual activities and desire. This 3-item component explained 24.47% of the variance, and its internal consistency value was 0.77. The third component was "sexual displeasure", which explained 12.58% of the variance. This 2-item component evaluated orgasm dissatisfaction and sexual displeasure (when items were reversed) and had an internal consistency value of 0.77. Finally, the fourth component, "impact on sexual position", identifies how PD symptoms negatively interfere with sexual position (e.g., finding an appropriate position). This last 2-item component explained 9.72% of the variance, and its internal consistency value was 0.72.

PHASE 3: EXAMINATION OF THE VALIDITY OF THE FINAL SCALE

Participants and procedure

In total, 221 participants were recruited. Among them, 207 were recruited from the internet (social networks dedicated to PD), and 14 were recruited from outpatients at the Lille University Medical Center with the same inclusion criteria. A subgroup of 191 participants agreed to complete subsequent questionnaires to establish its concurrent validity. Another subgroup of 65 participants responded to the 10-item scale online 15 days after the first completion to verify the questionnaire's reliability over time.

Demographic and clinical variables

Sex, age, and conjugal status were recorded as well as the year of diagnosis. All antiparkinsonian medications were registered, and doses were converted to levodopa equivalent daily dose (LEDD) after removing missing or incoherent data: LEDD-dopamine agonist, LEDD-levodopa, and LEDD-total [38]. Nonmotor and motor aspects of experiences of daily living were assessed by PwPD with parts 1 and 2 of the MDS-UPDRS, respectively. Participants reported the number of intercourse sessions during the previous month and completed the 10-item scale. The subgroup that agreed to complete the concurrent validity questionnaires also completed the French versions of the Hospital Anxiety and Depression Scale (HADS) and Index of Sexual Satisfaction (ISS).

The HADS [39, 40] comprises 14 items that are rated on a 4-point scale and equally divided into two subscales assessing the presence and severity of anxiety symptoms (HADS-A) and depressive symptoms (HADS-D). Higher scores indicate more severe symptoms. The French version of the HADS has demonstrated good internal consistency for the depression and anxiety subscales, with Cronbach's alpha values of 0.78 and 0.81, respectively [41].

The original ISS [42] consists of 25 items, but in the French version, 6 items were removed. Thus, this questionnaire consists of 19 items scored on a five-point scale ranging from "rarely or never" to "most of the time or always". Higher scores correspond to higher levels of sexual dissatisfaction. The French version of the ISS has shown good internal reliability, with a Cronbach's alpha of 0.96 [43].

Table 1
Loadings of the 10 items in the four-component solution obtained by principal component analysis after varimax rotation*

Items	Components			
	Hypersexuality	Low sexual esteem	Sexual displeasure	Impact on sexual position
I have more sexual fantasies than usual	**0.86**			
I feel more excited than usual	**0.83**		–0.21	
I masturbate more often than usual	**0.80**			
I've lost my sexual confidence		**0.85**	0.28	
I'm afraid of disappointing a sexual partner		**0.85**		0.22
I feel diminished in my sex life		**0.71**	0.42	0.23
My orgasms are satisfying**			**0.91**	
I get pleasure from sexual activity**	–0.22		**0.86**	
During sex, pain prevents me from finding a comfortable position				**0.87**
Certain sexual positions are limited by my symptoms		0.22		**0.87**
Explained variance	2.13	2.08	1.90	1.65
Percentage of explained variance	21.28	20.76	19.02	16.48

*Principal loadings on each component are shown in bold. To facilitate readability, loadings below 0.20 are not shown. **Reversed score.

Statistical analysis

The factor structure of the 10-item scale was verified via principal component analysis followed by varimax rotation. A confirmatory factor analysis was conducted with JASP (version 0.14.1) to determine the goodness of fit of the model using the diagonally weighted least squares (DWLS) method, which is more appropriate for ordered categorical variables [44, 45]. Model fit was estimated using the following adjustment criteria: the chi-square/degrees of freedom ratio (χ^2/df>3), the comparative fit index (CFI), the Tucker-Lewis index (TLI) (the adjustment was considered good when the index was ≥ 0.95 and acceptable when the index was ≥ 0.90), the root mean square error of approximation (RMSEA) and standardized root mean residual (SRMR) (values < 0.06 were considered good and values < 0.08 were considered satisfactory) and the goodness-of-fit index (GFI) (good fit when the GFI was > 0.85) [46–50]. The convergent and discriminant validity of the 10-item scale were assessed with Pearson's correlations. The internal consistency of the four components was calculated using Cronbach's alpha.

Results

Participants

Among the 221 participants, 56.56% were men, 81.90% had a partner, and the mean number of intercourse sessions during the last month was 4.14 (SD = 5.67). The participants were 59.07 years old on average (SD = 9.24) and had been diagnosed for an average of 7.56 years (SD = 6.21). The mean LEDD-dopamine agonist was 100.53 mg per day ($N = 192$; SD = 110.27), the mean LEDD-levodopa was 499.82 mg per day ($N = 206$; SD = 469.73), and the mean LEDD-total was 663.04 mg per day ($N = 179$; SD = 462.37). The mean scores on the motor subscale of the MDS-UPDRS were 11.54 (SD = 6.80), and the mean score on the nonmotor subscale of the MDS-UPDRS was 10.38 (SD = 4.52).

Multidimensional results

The principal component analyses revealed a 10-item scale organized into the same four components as those in Step 2 that explained 77.55% of the total variance (Table 1). The first 3-item component, "hypersexuality", explained 21.28% of the variance; the second 3-item component, "low sexual esteem", explained 20.76% of the variance; the third 2-item component, "sexual displeasure", explained 19.02% of the variance; and the fourth 2-item component, "impact on sexual position", explained 16.48% of the variance. No double loading was observed.

Confirmatory factor analysis

The analyses revealed a satisfactory fit between the model and the data (χ^2/df = 2.5; CFI = 0.99; TLI = 0.98; RMSEA = 0.083, 90% CI [0.060–0.107]; SRMR = 0.085; GFI = 0.985).

Correlations between the components

A "low sexual esteem" score was positively correlated with both the "sexual displeasure" score ($r = 0.36$, $p < 0.001$) and the "impact on sexual position" score ($r = 0.46$, $p < 0.001$). Moreover, the "sexual displeasure" score was negatively correlated with the "hypersexuality" score ($r = –0.20$,

Table 2
Correlations between PD-SDS dimensions and anxiety and depression symptoms, sexual satisfaction, motor and nonmotor PD symptoms, age and levodopa equivalent daily dose

	HADS-A	HADS-D	ISS	MDS-UPDRS NON-MOTOR	MDS-UPDRS MOTOR	AGE	LEDD-levodopa	LEDD-agonist	LEDD-total
PD-SDS dimensions:									
Low sexual esteem	0.29**	0.39**	0.37**	0.20**	0.13*	–0.03	0.18*	–0.02	0.16*
Sexual displeasure	0.27**	0.35**	0.71**	0.31**	0.11	0.10	0.12	–0.04	0.10
Hypersexuality	0.05	0.04	–0.03	0.05	0.04	–0.10	–0.05	0.01	–0.04
Impact on sexual position	0.04	0.10	0.07	0.18**	0.29**	0.05	0.14*	–0.11	0.14

*Bravais-Pearson's r ($N = 191$). *$p < 0.05$; **$p < 0.01$; **$p < 0.001$; HADS-A, HADS anxiety score; HADS-D, HADS depression score; MDS-UPDRS nonmotor, MDS-UPDRS nonmotor PD symptoms score; MDS-UPDRS motor, MDS-UPDRS motor PD symptoms score; LEDD, levodopa equivalent daily dose.

$p = 0.003$). The other correlations were not significant.

Internal consistency and reliability

The four components showed good internal consistency, with Cronbach's alpha values of 0.81 for "low sexual esteem", 0.78 for "hypersexuality", 0.81 for "sexual displeasure" and 0.76 for "impact on sexual position". The reliability over time (15 days) was 0.71 ($p < 0.001$) for "low sexual esteem", 0.75 ($p < 0.001$) for "sexual displeasure", 0.69 ($p < 0.001$) for "hypersexuality" and 0.71 ($p < 0.001$) for "impact on sexual position".

Construct validity

Correlations between the four components of the scale and the other clinical scales are presented in Table 2. The "hypersexuality" score was the only component not significantly correlated with the other measures. The "low sexual esteem" and "sexual displeasure" scores were significantly and positively correlated with the severity of anxiety and depression symptoms, low sexual satisfaction, and severity of PD nonmotor symptom scores, and a "low sexual esteem" score was also positively associated with the severity of PD motor symptoms and with the LEDD-levodopa and total LEDD scores. Finally, the "impact on sexual position" score was significantly and positively correlated with the severity of PD nonmotor and motor symptoms and with LEDD-levodopa.

DISCUSSION

Literature searches have shown that no tools have been designed for assessing the specific sexual experiences of PwPD [14, 15]. This study aimed to determine the different aspects of sexual difficulties in PwPD and to develop a scale to detect and evaluate the sexual difficulties of PwPD. The main contribution of this study is the development and validation of a screening tool, the Parkinson's Disease Sexual Difficulties Scale (PD-SDS).

The PD-SDS allows the assessment of four aspects of PD-related sexual difficulties: low sexual esteem, sexual displeasure, impact on sexual position and hypersexuality. The analyses revealed a model with a satisfactory fit and good psychometric properties for these four dimensions (with good internal consistency and high reliability over time). It is arguable that other scales designed for non-PD populations are available to specifically and more thoroughly assess the PD-SDS dimensions with more items. Indeed, sexual functioning (sexual desire, arousal, orgasm, and satisfaction) can be assessed with the most currently used scales, such as the Arizona Sexual Experiences Scale (ASEX) [51]; gender-specific scales, such as the Female Sexual Function Index [52] or the International Index of Erectile Function [53]; hypersexuality with the Hypersexual Behavior Inventory (HBI) [54] or Hypersexual Behavior Consequences Scale (HBC) [55]; and sexual esteem with the Sexuality Scale [56]. Nevertheless, there are four major features of the PD-SDS that stand out: First, the short format of this scale permits the identification of difficulties in one or more of these 4 dimensions with a single and quick tool. Its briefness is a very important advantage because sexual difficulties are underexplored by physicians due to lack of time during a consultation [22, 23]. The PD-SDS can even be filled out in the waiting room to prepare PwPD to talk about this aspect of life and to ask themselves questions that they may never have asked themselves before. Second, the PD-SDS constitutes a preliminary screening tool that will enable physicians to facilitate investigations and dialogues, to identify problematic dimensions to explore more

deeply with other specialized scales or interviews, and to provide better guidance. Third, a benefit of this scale, with items designed for both sexes, is that it is usable for both men and women. The PD-SDS can quickly and easily identify general sexual displeasure with high scores in this dimension and this may encourage physicians to deepen the investigation in a second step with gender-specific scales to consider issues related to gender and to provide more accurate and detailed information about gender-specific difficulties. Moreover, for research purposes, a single scale for both sexes will allow us to assess differences or similarities across sexes. Fourth, the scale examines a dimension that has never been investigated by other tools before called "impact on sexual position", which assesses the repercussions of PD symptoms on sexual positions.

In addition, the relationships between the four PD-SDS component scores and the relationships between these component scores and the results of complementary questionnaires also provided some insight into the nature of the sexual difficulties experienced by PwPD as measured with the PD-SDS. Physicians will be able to propose support according to the difficulties identified.

The "hypersexuality" component corresponds to the identification of an increase in sexual activity and desire compared to usual sexual activities and desire. Surprisingly, there was no correlation between the hypersexuality score and the LEDD score. This result may be explained by the fact that the correlations are overwhelmed by the different PwPD profiles: low hypersexuality with high LEDD (treatment is well tolerated and has no side effects), high hypersexuality with high LEDD (treatment needs to be adjusted), low hypersexuality with low LEDD and high hypersexuality with low LEDD. This latter profile is underestimated by clinicians. It may be explained either by subliminal symptoms that persist despite treatment adjustment and are detected by the scale or by "reassurance sexual behaviors" involving repeated requests to the partner, for example, to check sexual function. It would therefore be interesting to carry out a cluster study to identify the different profiles and their clinical characteristics.

Moreover, the results showed a negative correlation between the "hypersexuality" score and the "sexual displeasure" score. This finding may suggest that PwPD who exhibit more sexual behaviors than usual also exhibit greater sexual satisfaction, which can explain why they might not report hypersexuality to their physicians and why it is more often the partner who reports it [7]. Indeed, hypersexuality may have a negative impact on couples' relationships: anger, conflict, avoidance and rejection of intimacy, loss of confidence, feelings of betrayal, shock or even trauma, and divorce [58]. If a couple stays together, they will need time to be able to forgive their partners, and engagement in couples therapy may be necessary to develop new intimacy skills and build honest and respectful communication and empathy [58]. The "hypersexuality" score may help physicians identify not only PwPD who need an adjustment to treatments but also those who need an assessment of their partner's feelings and the impact on their relationship; if necessary, physicians may suggest psychoeducational groups for the partner or the couple.

The "low sexual esteem" component corresponds to how PwPD perceive themselves and are confident in their capacity to experience sexuality and to satisfy their partner. Our correlation analyses suggest that PwPD with low sexual esteem are more anxious and more depressed and have more severe nonmotor symptoms. Indeed, the modification of one's appearance, excessive sweating, swallowing disorders and incontinence may cause embarrassment and anxiety and contribute to the deterioration of one's sexual image and self-confidence about one's sexual capacity and to a reduced level of attractiveness [59]. When PwPD have high scores on the "low sexual esteem" component, physicians may propose psychological support to increase self-esteem and self-confidence. Specific sexual support will also improve sexual confidence, reduce anxiety, improve self-image and self-awareness, increase sensory feelings, reduce negative thoughts and promote inter-couple communication [60].

The "sexual displeasure" component corresponds to orgasm dissatisfaction and sexual displeasure. The correlation analyses suggest that PwPD with high sexual displeasure (low sexual pleasure, less satisfying orgasms) are more anxious, more depressed, less sexually satisfied and have low sexual esteem. This finding is consistent with previous studies showing that a decrease in sexual esteem and the presence of anxiety, especially depressive symptoms, play a role in sexual dysfunction (e.g., lower interest in sexuality, a decrease in libido/sexual desire, decreased sexual arousal) [13, 17], leading to a decrease in sexual satisfaction [61]. The "sexual displeasure" score may thus be useful for identifying PwPD who need pharmacologic treatments and/or technical interventions to support their sexual function [62] or for urological or gynecological support, particularly when urinary

disorders are associated with sexual dissatisfaction [18]. Moreover, when sexual displeasure is associated with low sexual esteem, physicians may propose psychological and/or sexual support to improve sexual esteem, and when sexual displeasure is associated with anxiety or depression, physicians may evaluate the need for intervention and treatment to support an improved emotional state.

The "impact on sexual position" component highlights the way PD symptoms and pain can negatively interfere with sexual activities, especially with sexual positions. The severity of motor symptoms contributes to the general decrease in sexual activity and quality of life in PwPD [12]. In an Egyptian subpopulation of PwPD, Deraz et al. [8] reported that more severe motor symptoms were associated with more severe sexual dysfunction. In our study, we did not observe any correlation between the "impact on sexual position" score and the "sexual displeasure" score. Nevertheless, the results showed that PwPD who were more sexually restricted by their symptoms had lower sexual esteem. The "impact on sexual position" score can help to identify PwPD who need support for pain and motor symptoms through medication and/or body approaches [63–65] and/or hypnosis [66, 67]. Moreover, sexual support may be additionally proposed, if necessary, for improving sexual esteem and developing communication skills to facilitate adequate sexual planification and alternative sexual expressions/positions adapted to PD motor symptoms.

Another interesting finding is that age was not correlated with any of the four subscale scores. Although several studies have shown a positive association between age and general sexual disorders in PwPD [68–71], it seems that this association is not related to "hypersexuality", "sexual esteem", "the impact on sexual position" or "sexual displeasure". This result suggests that the sexual difficulties of all PwPD should be evaluated, regardless of their age.

Limitations

This study has several limitations that may limit the generalizability of the results. First, interviews, which served to develop the initial pool of items, were conducted with 10 men and only 4 women because it was difficult to recruit women with PD who agreed to share their sexual experiences. Second, the sample mainly included PwPD aged an average of 60 years, which is quite young. This could be because most of the participants participated online. Indeed, older people have less access to computer and social networks. More information on women's and older PwPD's experiences would enable us to extend the selection of items to all population categories with PD. It would also be interesting to balance the groups and compare the sexual experiences of PwPD according to age and type of sexual partner outside couple relationships. Finally, the data concerning the treatments came mainly from the participants themselves and were not checked by the physicians, which resulted in a large amount of missing or inconsistent data.

Conclusions

Overall, the PD-SDS is a valid and reliable questionnaire. This 10-item scale assesses how PwPD experience their sexuality. Its briefness makes it easy to use for clinical purposes. According to Bronner et al. [72], 74% of men with PD and 40% of women with PD are interested in receiving sexual counselling, although difficulties in tackling the subject during visits are reported by both PwPD and physicians [16, 21–23]. This scale could enable PwPD to ask themselves questions that they may never have asked themselves before, facilitate dialogue about sexuality, and help physicians identify PwPD who need support due to low sexual esteem, sexual displeasure, a lack of sexual expression due to motor symptoms, and/or hypersexuality.

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CONFLICT OF INTEREST

The authors declare no conflicts of interest related to this article.

DATA AVAILABILITY

The data supporting the findings of this study are available upon request from the corresponding author. The data are not publicly available due to privacy or ethical restrictions.

SUPPLEMENTARY MATERIAL

The supplementary material is available in the electronic version of this article: https://dx.doi.org/10.3233/JPD-240063.

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