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The prevalence of psychological distress in Parkinson's disease patients: the Brief Symptom Inventory (BSI-18) versus the Hopkins Symptom Checklist (SCL-90-R)

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ABSTRACT

The prevalence of psychological distress in Parkinson's disease (PD) patients has been evaluated by many different assessment instruments and with diverse control groups. The most frequently used distress symptom scale has been the Hopkins Symptom Checklist (SCL-90-R), although it contains many symptoms with problematic validity clinically. The 18-item subscale of the SCL-90-R, the Brief Symptom Inventory (BSI-18) has recently been shown to have a sufficient validity to screen for the prevalence of psychological distress (somatization) in PD patients.

We have performed a clinimetric analysis by comparing the BSI-18 with SCL-90-R relevant subscales in PD patients. Our micro-analysis has focused on the Mokken model to test the scalability of the subscales. The macro-analysis has focused both on effect size statistics and the normative level of psychological distress with reference to the Italian general population data using T-score metric. The Mokken analysis indicated acceptable scalability for all the subscales of BSI-18. The effect size statistics identified somatization in both BSI-18 and SCL-90-R as the most prevalent and intense symptom of psychological distress. The T-score metric identified the phobic anxiety subscale of SCL-90-R to be clinically much more important than the BSI-18 anxiety subscale in the PD patients. We have found the SCL-90-R subscale of phobic anxiety and the BSI-18 somatization subscale most clinically valid when measuring psychological distress in PD patients.

Keywords: BSI-18; Parkinson's disease; Phobic anxiety; SCL-90-R; Somatization.

Abbreviations: PD, Parkinson's Disease; SCL-90-R, Hopkins Symptom Checklist-90-Revised; BSI-18, Brief Symptom Inventory; HSCL, Hopkins Symptom Checklist; GSI, Global Severity Index; DCPR, Diagnostic Criteria for Psychosomatic Research.

1. Introduction

The Hopkins Symptom Checklist (HSCL) was originally developed as a discomfort scale by Parloff et al. (1954) in order to measure improvement in patients with neurotic disorders. This first version (SCL-41), published by Bech (1993), was considered as a general dimension of distress or demoralization covering both bodily and emotional symptoms of distress. The scale was later enlarged to SCL-58 by Derogatis et al. (1971) with focus both on the clinical content and on a psychometric analysis of the scale. As described by Derogatis et al. (1974), this SCL-58 covered clinically the clusters of anxiety, depression, hostility and obsessive-compulsive states and covered psychometrically the factors of somatization, obsessive-compulsive, interpersonal sensitivity, depression, and anxiety states. The ultimate version, the SCL-90-R (Derogatis, 1994) included psychometrically nine factors: somatization, obsessive-compulsive, interpersonal sensitivity, depression, anxiety, anger-hostility, phobic anxiety, paranoid ideation, and psychoticism.

We have recently used the SCL-90-R to evaluate psychiatric symptoms in Parkinson's disease (PD) patients (Carrozzino et al., 2018). Specifically, we have found that the most prevalent and severe symptoms affecting our PD patients were somatization and phobic anxiety (Carrozzino et al., 2018). Abraham et al. (2017) have recently shown that the 18-item version of the Brief Symptom Inventory (BSI-18) seemed psychometrically valid in patients with PD. Specifically, by use of factor analysis, they were able to identify the three factors included in the BSI-18, namely somatization, anxiety, and depression (Abraham et al., 2017). Actually, the BSI-18, which covers 18 of the 90 items in the SCL-90-R, was originally used by Derogatis and his research group (Zabora et al., 2001) to measure psychological distress in cancer patients. In their study, Abraham et al. (2017) have found that the BSI-18 somatization subscale was the most important clinical component of psychological distress in their PD patients. Table 1A shows the original 12-items of the somatization subscale in the SCL-90-R and the corresponding 6 items from the BSI-18 somatization subscale. The factor of anxiety in the BSI-18 included the 6 items of nervousness, tense, scared, panic, restlessness, and fearful, which are not to be found in the SCL-90-R subscale of phobic anxiety (Table 1B).

On this background, we have reconsidered the main results of our previous SCL-90-R study in PD patients (Carrozzino et al., 2018) by focusing now on the BSI-18 with the aim to provide an answer to the following two research questions:

- 1) Is the BSI-18 subscale of somatization as valid as the SCL-90-R subscale of somatization when measuring the prevalence of psychological distress in PD patients?
- 2) Is the BSI-18 subscale of anxiety as valid as the SCL-90-R subscale of phobic anxiety when measuring the prevalence of psychological distress in PD patients?

2. Methods

2.1. Sample

A clinical sample on PD patients from the Parkinson Institute, ASST “Gaetano Pini-CTO”, Milan, Italy, was used (Siri et al., 2010). For study inclusion, only non-demented outpatients having a medical diagnosis of PD according to the UK Brain Bank clinical criteria (Hughes et al., 1992) were included in the analysis. The data were collected by mailing the SCL-90-R to all outpatients with parkinsonism who were followed at the Italian Parkinson Institute (Goldwurm et al., 2006). The patients completed the SCL-90-R as self-report and mailed it back to the Institution. The outpatients were enrolled according to the Declaration of Helsinki (General Assembly of the World Medical Association, 2013) following obtainment of a written informed consent, reporting details about the research aims of the study. The study received the official approval by the Local Ethical Committee of the Parkinson Institute, ASST “Gaetano Pini-CTO”, Milan, Italy.

The Italian general population, acting as control sample, comprised participants recruited from all over Italy. This data set is part of the original study performed by Carrozzino et al. (2016), who considered this sample representative of the non-institutionalized Italian population aged 18 years and above. The data were collected by trained investigators after written informed consent had been obtained. The participants were enrolled according to cross-stratified criteria for age and gender on the basis of the census projections of the Italian National Institute for Statistics (Carrozzino et al., 2016). The participants were instructed by investigators to complete the SCL-90-R as a self-rating scale. Any type of information collected by investigators was ensured by a nameless numerical code. The study was approved by the Local Ethical Committee and accepted by the Institutional Review Board of the Department of Psychological, Health, and Territorial Sciences, University “G. d’Annunzio” of Chieti-Pescara, Chieti, Italy.

2.2. Measure

The BSI-18 contains 18 of the 90 items in the SCL-90-R (Abraham et al., 2017; Arrindell et al., 2017; Derogatis and Fitzpatrick, 2004; Zabora et al., 2001). Each item in the SCL-90-R as well as in the BSI-18 is scored on a five-point Likert scale. The participant is asked to report how much a given item distressed or bothered him or her during the past week (0=not at all, 1=a little bit, 2=moderately, 3=quite a bit, 4=extremely). Apart from the 6-item somatization subscale and the 6-item anxiety subscale, the BSI-18 includes a depression subscale with the following 6 items: sad, no interest in things, lonely, worthless, hopeless, having suicidal thoughts. We analyzed also three SCL-90-R subscales. Specifically, we focused on the 12-item somatization subscale (Table 1A) and the 7-item phobic anxiety subscale (Table 1B), as well as on the 10-item psychoticism subscale as in our previous study (Table 1C), because these three SCL-90-R subscales were found to have a clinically significant effect size of 0.80 or higher (Carrozzino et al., 2018). In addition to these clinical subscales, an overall general psychological distress factor, the global severity index (the GSI-18), covering the BSI-18 total score, was used.

Table 1A		
The 12-item somatization subscale in the full SCL-90-R versus the 6 items* of the somatization subscale in the BSI-18.		
	SCL-90-R (original item numbering)	
	(1)	Headaches
*	(4)	Faintness or dizziness
*	(12)	Pains in chest or heart
	(27)	Pains in lower back
*	(40)	Nausea or upset stomach
	(42)	Soreness of your muscles
*	(48)	Trouble getting your breath
	(49)	Hot or cold spells
*	(52)	Numbness or tingling in parts of your body
	(53)	A lump in your throat
*	(56)	Feeling weak in parts of your body
	(58)	Heavy feelings in your arms or legs
Table 1B		
The 7-item phobia/anxiety subscale from the full SCL-90-R		
SCL-90-R Phobia anxiety scale (original item numbering)		
	(13)	Feeling afraid in open spaces or on the streets
	(25)	Feeling afraid to go out of your house alone
	(47)	Feeling afraid to travel on buses, subways, or trains

	(50)	Having to avoid certain things, places, or activities because they frighten you
	(70)	Feeling uneasy in crowds, such as shopping or at a movie
	(75)	Feeling nervous when you are left alone
	(82)	Feeling afraid you will faint in public
Table 1C		
The 10-item psychoticism subscale from the full SCL-90-R		
	SCL-90-R Psychoticism scale (original item numbering)	
	(7)	The idea that someone else can control your thoughts
	(16)	Hearing voices that other people do not hear
	(35)	Other people being aware of your private thoughts
	(62)	Having thoughts that are not your own
	(77)	Feeling lonely even when you are with people
	(84)	Having thoughts about sex that bother you a lot
	(85)	The idea that you should be punished for your sins
	(87)	The idea that something serious is wrong with your body
	(88)	Never feeling close to another person
	(90)	The idea that something is wrong with your mind

2.3. Co-variables

Age and gender were considered.

2.4. Statistical analyses

We have focused on a clinimetric approach (Fava et al., 2012) to analyze the SCL-90-R and the BSI-18 subscales. More specifically, we focused on Tomba and Bech (2012) to perform firstly the clinimetric microanalysis of the scales by use of item response theory model by Mokken (1971). In this model, the coefficient of homogeneity is an expression of the extent to which the items in a scale can be mapped on their locations within the underlying dimension of psychological distress severity. A coefficient of homogeneity from 0.30 to 0.39 indicates a just acceptable scalability, i.e. the items are hanging together so that their summed total score is just acceptable. Coefficients of homogeneity of 0.40 or higher indicate quite acceptable scalability (Bech, 2012; Loevinger, 1948; Mokken, 1971). The coefficient of homogeneity was calculated by use of the statistical program developed by Molenaar et al. (1994).

Consistent with Tomba and Bech (2012), we have in the clinimetric macro-analysis focused both on effect size statistics and T-score metric. The effect size statistics were used in accordance with

Schmitz et al. (2000) and Carrozzino et al. (2018). Effect size statistics were computed using the mean difference in scales scores (patients versus participants) divided by their pooled standard deviations. An effect size higher than 0.40 was considered borderline (Arnold, 2011), whereas an effect size of 0.80 or higher was considered clinically significant (Cohen, 1988). The effect size statistics as a provisional answer to the clinical question “how much” are not limited to detect simply the presence or absence of a statistically significant difference as a p-value does, but it provides more important clinical information enabling clinicians to account for the degree of an effect (Carrozzino et al., 2018).

The T-score metric was recommended by Derogatis and Lazarus (1994), where the normalized T-scores are considered analogue to the normalized Z-scores as described by Crocker and Algina (1986). More specifically, as suggested by Derogatis and Lazarus (1994) the general formula for the T-score is $T=50+10$ where the norm group will have a mean of 50 and a standard deviation of 10 points. As illustrated by Crocker and Algina (1986), a normalized T-score of 60 always will place the respondent in the 84th percentile of the reference norm, and a T-score of 63 in the 90 percentile of the reference norm, whereas a T-score of 65 in the 95 percentile of the reference norm. Derogatis and Lazarus (1994) recommended to use a T-score of 63 or more as the cut-off score for detecting the prevalence of a clinically relevant distress syndrome on the SCL-90-R, whereas we also have considered the T-score of 65 or more as the cut-off score (Bech et al., 2018a). We have calculated the normalized T-scores in accordance with Mortensen and Gade (1992), by using the reference norm as obtained by Carrozzino et al. (2016).

3. Results

A total of 472 PD patients (282 males and 190 females) had completed the SCL-90-R without missing values and thereby the BSI-18 scale. The mean age of the 472 patients was 65.2 years (SD=10.3). To compare these PD patients with healthy controls, out of 808 participants from the Italian general population (mean age of 48.1 years [SD=16.8]) we selected only a subgroup of 333 participants (197 males and 136 females) with a mean age of 65.0 years (SD=7.3).

Table 2 shows the Mokken analysis of the BSI-18 subscales (depression, anxiety, and somatization) and total score (GSI-18). The BSI-18 depression, anxiety, somatization subscales and the total GSI-

18 reached a statistically just acceptable level of scalability with Loevinger's coefficients of homogeneity ranging from 0.35 to 0.53.

Table 3 shows the effect size statistics when comparing the 472 PD patients with the 333 participants from the general population on the BSI-18 subscales and GSI-18, as well as on the SCL-90-R subscales of phobic anxiety, somatization, and psychoticism. The effect size for the SCL-90-R subscales of phobic anxiety and somatization was above the clinically significant level of 0.80, whereas the SCL-90-R subscale of psychoticism obtained a clinically not significant effect size of 0.74. By focusing on the same level of important clinical significance of 0.80 in effect size, the two BSI-18 subscales of depression and anxiety were not found significant, whereas the 6 items of the BSI-18 somatization subscale and the psychological distress factor of the GSI-18 obtained a clinically significant effect size of 0.98 and 0.90 respectively.

Table 4 shows the transformation of the raw scores of the BSI-18 and SCL-90-R subscales to normalized T-scores. For comparison the results of the study by Abraham et al. (2017) are also included in the Table 4 using the cut off T-score of ≥ 63 for evaluation of the prevalence of psychological distress in PD patients. In general, our percentage of caseness was twice as high as the Abraham et al. (2017) findings. Table 4 shows also the prevalence of psychological distress when using the cut off T-score of ≥ 65 . Whereas the SCL-90-R and the BSI-18 subscales indicated a quite similar prevalence of somatization symptoms (36.2% and 38.8%, respectively), phobic anxiety reached a prevalence of 55.5% when measured by the specific SCL-90-R subscale versus a percentage of anxiety symptoms of only 23.3% by using the 6 items in the BSI-18 subscale of anxiety. Concerning the GSI-18, the cut off T-score of ≥ 65 indicated a prevalence of psychological distress around 28.4%. When using the cut off T-score of ≥ 63 , the percentage of psychological distress increased up to 36.4%.

Table 2. Mokken analysis: Coefficients of homogeneity (scalability).

BSI-18 subscales	Italian PD-patients N = 472	Italian general population N = 333
Depression-6	0.53	0.46
Anxiety-6	0.43	0.49
Somatization-6	0.35	0.45
GSI-18	0.36	0.38

Abbreviations throughout the table. BSI-18 = Brief Symptom Inventory. GSI-18 = Global Severity Index. PD = Parkinson's disease.

Table 3. Mean (sd) for the individual subscales and the corresponding effect size.

BSI-18 subscales	Italian PD-patients N = 472	Italian general population N = 333	Effect size
Depression-6	0.95 (0.79)	0.50 (0.57)	0.64
Anxiety-6	0.95 (0.73)	0.49 (0.54)	0.70
Somatization-6	0.99 (0.64)	0.41 (0.52)	0.98
GSI-18	0.97 (0.61)	0.47 (0.46)	0.90
SCL-90-R subscales			
Phobic anxiety-7	0.63 (0.64)	0.14 (0.29)	0.93
Somatization-12	1.16 (0.64)	0.54 (0.52)	1.04
Psychoticism-10	0.60 (0.52)	0.26 (0.35)	0.74

Abbreviations throughout the table. BSI-18 = Brief Symptom Inventory. GSI-18 = Global Severity Index. PD = Parkinson's disease.

Table 4. Transformation to normalized T-scores including cut off for ≥ 63 as well as ≥ 65 to indicate percentage of symptoms of psychological distress in PD patients (N = 472). Prevalence in percent.

BSI-18 subscales	Study by Abraham et al. (2017) N = 1067		Present study PD patients = 472		
	T-scores	Prevalence %	T-scores	Prevalence %	
		≥ 63		≥ 63	≥ 65
Depression-6	50.8	15.4%	56.7	27.5%	22.0%
Anxiety-6	52.1	15.0%	57.3	29.6%	23.3%
Somatization-6	54.6	22.5%	61.8	47.7%	38.8%
GSI-18	53.4	18.7%	59.5	36.4%	28.4%
SCL-90-R subscales					
Phobic anxiety-7	NA	NA	64.4	55.5%	55.5%
Somatization-12	NA	NA	61.6	45.1%	36.2%
Psychoticism-10	NA	NA	59.5	36.9%	29.9%

Abbreviations throughout the table. BSI-18 = Brief Symptom Inventory. GSI-18 = Global Severity Index. NA = Not Available. PD = Parkinson’s disease.

4. Discussion

Compared with percentages of psychological distress around 18.7% that have been found by Abraham et al. (2017) using the cut-off T-score of ≥ 63 , our PD patients reported clinically higher levels of psychological distress. However, our sample of PD patients (Siri et al., 2010) was comparable, in terms of clinical characteristics (i.e., similar mean age, as well as the same severity of medical condition as evaluated by the Hoehn and Yahr stage) (Hoehn and Yahr, 1967), to the group of PD patients from the study of Abraham et al. (2017).

As stated by Nunnally and Bernstein (1994) the raw total scores of a scale are usually not informative by itself and they therefore recommended norms by the transformation of the raw scores to T-scores. However, Nunnally and Bernstein (1994) found it very important to evaluate the scalability of the questionnaire being investigated because an acceptable scalability is a requirement for calculating T-scores. According to Mortensen and Gade (1992) for questionnaires with an acceptable scalability, there is a high concordance between linear T-scores and normalized T-scores. For the BSI-18 depression subscale, we obtained a normalized T-score of 56.7 (Table 4) and when using the linear T-score we actually obtained 56.2. Wahl et al. (2014) obtained a linear T-score on the BSI-18 depression subscale of 54.8. However, Wahl et al. (2014) recommended using a linear T-score of 65 or higher for moderate depression.

Concerning our first research question, the answer is “yes” as we have found that the BSI-18 subscale of somatization was as valid as the SCL-90-R subscale of somatization in terms of measuring the prevalence of psychological distress in PD patients. When using the cut off score of ≥ 63 in the T-metric, the prevalence of somatization was 47.7% on the BSI-18 specific subscale and 45.1% on the corresponding subscale of the SCL-90-R. Similar clinically high percentages were observed when using the T-score of ≥ 65 as cut-off score. Compared to patients from the study of Abraham et al. (2017), somatization was more prevalent in our PD patients. Such elevated percentages of somatization symptoms were instead consistent with prevalence rates reported by Bugalho et al. (2012) who evaluated a small sample of 36 patients in the early stages of PD. The evidence that somatization was not only the most common but also the most severe non-motor symptom affecting PD patients was clearly pointed out also in our recent research study (Carrozzino et al., 2018), and in our systematic review as well (Carrozzino et al., 2017). Such an evidence was now further confirmed in terms of effect size statistics (Table 3).

From a measurement point of view, the finding that the BSI-18 subscale of somatization was accepted by Mokken analysis indicates not only that somatization is a clinically valid condition in PD, but also that this brief measure is statistically sufficient for screening for the prevalence and the severity of somatization by use of 6 items. Having found clinically valid the use of this BSI-18 somatization subscale is very relevant within a measurement-based care perspective (Bech, 2016a), which is an attempt to focus on short, easy to use scales in the clinical practice. Indeed, when taking the temporal brevity (i.e., a mean duration of less than 15 minutes) of each daily clinic visit into account, it is essential and very important for both clinicians and patients to have easy to administer, brief and clinically valid scales on which to focus on for a practical and collaborative outcome evaluation planning (Bech, 2016a). As outlined by Bech (2016b) in his recent editorial on clinimetric dilemmas in outcome scales, clinician-reported scales are highly recommended from a diagnostic point of view in order to further validate all of the preliminary results that have been obtained with self-rating scales. Indeed, self-reported instruments as the SCL-90-R and the BSI-18 can be used as screening measures for detecting the prevalence and measuring the severity of individual symptoms at a micro-analytic level, while clinical interviews, including those based on psychiatric criteria (ICD or DSM oriented), as well as clinician-reported scales as the revised version of the Diagnostic Criteria for Psychosomatic Research (DCPR) (Fava et al., 2017a), are clinically useful to provide a global evaluation of the patient at a macro-analytic level. On this background, self-rating scales and clinical interviews should be considered not as rivals but as

convergent solutions aimed at providing a comprehensive clinical assessment of psychological factors affecting treatment outcomes in PD patients. As a result, also in view of the medications, including psychotropic drugs, that PD patients have to take, self-rating scales as the BSI-18 and the SCL-90-R can be used within a clinical pharmacopsychology perspective (Fava et al., 2017b) to assess the degree of psychological side effects induced by the pharmacological treatment. Clinical pharmacopsychology is indeed an emerging area of application in clinimetrics that is aimed at providing a comprehensive clinical assessment of wanted and unwanted psychological effects, including well-being, induced by the pharmacological treatment (Fava et al., 2017b).

The answer to our second research question is “no” as we have found the SCL-90-R subscale of phobic anxiety (Table 1B) more valid than the BSI-18 subscale of anxiety in terms of measuring the prevalence of psychological distress in PD patients.

As shown in Table 4 the prevalence of phobic anxiety as measured by the SCL-90-R specific subscale was 55.5% independently whether the cut-off score in the T-metric was ≥ 63 or ≥ 65 . In contrast, the BSI-18 subscale on anxiety had only a prevalence of 23.3% when using the T-score of ≥ 65 as cut-off score. In terms of effect size statistics (Table 3) the SCL-90-R phobic anxiety subscale was second to the effect size of somatization.

In their BSI-18 study with PD patients, Abraham et al. (2017) correctly indicated that the anxiety subscale covered three items on panic anxiety and the other three items on generalized anxiety. However, the SCL-90-R phobic anxiety subscale is oriented towards such important day-to-day activities as being in open spaces or in crowds, being in public spaces, being traveling or other conveyances (Bech, 2016a). In patients with PD, these symptoms of phobic anxiety should not be considered as a primary psychiatric disorder, which has a prevalence of approximately 8% in the general population (Robins et al., 1984), but more correctly as a secondary psychiatric complication potentially linked to the progressive motor disability affecting patients with this neurodegenerative disorder (Carrozzino et al., 2018).

The SCL-90-R subscale of psychoticism was considered because the effect size was just above the clinically significant level of 0.80 in our previous research study (Carrozzino et al., 2018) in which the general population consisted of 808 participants. In the present analysis (Table 3), where the general population sample was matched with the PD sample, the number of healthy participants was only 333. As it appears from Table 3, the effect size for the SCL-90-R psychoticism subscale now

was reduced to 0.74 resulting in a prevalence of 29.9% when using the T-score of ≥ 65 as cut-off score. In the Canadian study on cancer patients, Farber et al. (1985) found that the SCL-90-R profile identified the factors of somatization, depression, and psychoticism as the most prevalent. In this group of cancer patients Farber et al. (1985) declared that withdrawal, isolation, and disconnectedness to other people are frequent complaints in these patients. The social content in the SCL-90-R psychoticism subscale seems also to be significant in patients with PD.

From a clinimetric point of view, our findings with the SCL-90-R and BSI-18 have a major impact on how to use these self-rating scales most properly. Traditionally, the SCL-90-R or BSI-18 have been considered as screening instruments for psychopathology (Sajatovic and Ramirez, 2012). However, already Maxwell (1971) indicated the inherent problems in the use of such symptom scales based on classical factor analysis to classify patients psychopathologically. Factor analysis is indeed a classical method to evaluate psychometrically the structure of a rating scale, but it is not a valid measurement indicator for testing whether the total score in a scale is a meaningful expression of the severity of a clinical condition (Bech, 2012). Conversely, only by focusing on the modern item response theory models as the Mokken analysis (Mokken, 1971), it is possible to test the scalability of the instrument under examination (microanalysis) (Bech, 2012; Tomba and Bech, 2012).

In our macro-analysis we demonstrated an acceptable concordance between the effect size of 0.80 or higher (i.e., the level of clinical significance revealing the elevated magnitude of the symptom under examination) and the cut-off T-score of 65 or higher. To the best of our knowledge this clinimetric solution to the methodological problems raised by Maxwell (1971) has not been applied previously.

5. Conclusion

The present research study showed that the SCL-90-R subscale of phobic anxiety and the 6-item version somatization subscale in the BSI-18, as well as the GSI-18, can be properly used as clinimetrically valid rating scales to detect not only the prevalence, but also the severity of symptoms of psychological distress affecting patients with PD. In *Clinical and Health Psychology* (Bertini et al., 2014; Carrozzino and Fulcheri, 2017; Guidi and Fava, 2014), time has come to focus on measurement-based care (Bech, 2016a; Bech et al., 2018a; Bech et al., 2018b) by using rating

scales that are easy to administer, acceptable for both patients and clinicians, short and valid in the clinical assessment of prevalence and intensity of psychological symptoms. Within this measurement-based care perspective (Bech, 2016a), the SCL-90-R and BSI-18 contain clinimetrically valid subscales that can be used not only in a research setting, but also in daily clinical practice to evaluate symptoms of psychological distress and treatment outcomes in PD patients.

Conflict of Interest

The authors have no financial or other conflicts of interest to disclose. All authors contributed in the preparation and writing of this manuscript.

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Highlights

- Somatization was the most intense symptom of psychological distress.
- Phobic anxiety is a clinically significant consequence of Parkinson's disease.
- Psychological distress reached a prevalence of 36.4% in Parkinson's disease.
- The somatization subscales in the BSI-18 and SCL-90-R were both clinically valid.
- The SCL-90-R phobic anxiety subscale is more valid than the BSI-18 anxiety factor.