

Psychometric evaluation of the Multidimensional Scale of Perceived Social Support (MSPSS) in people with chronic diseases

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Abstract

Purpose. This study aimed to evaluate the psychometric characteristics of the Multidimensional Scale of Perceived Social Support (MSPSS) in patients with chronic diseases.

Methods. Patients (n = 236) with chronic diseases completed the MSPSS and the 36-item Short Form Health Survey (SF-36) questionnaire. The MSPSS factorial structure was analysed using confirmatory factor analysis (CFA), and internal consistency reliability was evaluated with Cronbach's alpha, the factor score determinacy coefficient and the model-based internal consistency index. Concurrent validity was performed to correlate the MSPSS scores with the SF-36 scores.

Results. CFA supported the three-factor structure of the MSPSS with optimal fit indexes. Cronbach's alpha, the factor score determinacy coefficient and the model-based internal consistency index were equal to or greater than 0.89. Concurrent validity supported the significant correlations between the MSPSS and SF-36 scores.

Conclusions. The MSPSS has supportive validity and reliability and can be used to evaluate the perceived social support received by chronic patients.

Key words

- assessment
- instrument
- psychometric characteristics
- chronic disease
- social support

INTRODUCTION

The current health profile of Western countries is characterised by longer life expectancies and an increasing number of people who are affected by chronic diseases. In the United States, roughly 5 out of 10 adults suffer from one or more chronic health conditions that are responsible for 7 out of 10 deaths each year. In Europe, chronic diseases affect 8 out of 10 adults who are 65 years old and older [1]. The most prevalent of these illnesses include heart failure (HF), chronic obstructive pulmonary disease (COPD), diabetes mellitus (DM) and Parkinson's disease (PD) [2].

HF affects 2.1% of the total population in the United States [3] and 2.2% of the total population in Europe [4]. The prevalence of COPD varies from 3.9% to 9.3% in the United States and from 4% to 10% in Europe [5]. COPD is certainly underestimated and is often underdiagnosed [6]. The estimated prevalence of DM among adults is 9.3% in the United States and 8.3% in Europe. By the year 2035, the prevalence of DM is expected to increase to 10% in the general population and to 25%

in the elderly population [7]. PD represents the second most common neurodegenerative disease internationally. In the United States, approximately 60 000 people are diagnosed with PD each year, and in Europe, it affects about 1.6% of those who are 65 years old or older [8].

The impact of HF, COPD, DM and PD on healthcare systems is relevant because these diseases are incurable, lifelong afflictions that absorb many formal and informal resources. In fact, most of the social support that is given to people affected by HF, COPD, DM and PD is provided by friends, family members and significant others who exist outside of the healthcare system. This social support is considered essential for managing and reducing the progression of chronic diseases [9, 10]. If this social support were unavailable, healthcare systems would not be able to meet the demand of care, and this inability could lead to serious consequences to patients' health and influence health-related quality of life (QOL) [11]. QOL is defined as "a subjective perception, influenced by the current health status, of the

ability to perform those activities important for the individual" [12], p. 664].

Evidence shows that social support improves QOL, health outcomes and disease management for people with chronic diseases. For example, social support that is provided to people with HF has been associated with improved QOL, reduced hospital readmission [13], decreased cardiac symptoms [11], reduced emotional distress [13], increased adherence to treatment [14] and self-efficacy [15]. For COPD, social support has been associated with reduced hospitalisation and exacerbation of the disease and with improvements in anxiety, depression, well-being, health status [16] and disease management. In patients with DM, social support can positively affect disease control [17]. In cases of PD, social support has been associated with positive well-being [18].

Several instruments have been developed to assess perceived social support. One of these instruments is the Multidimensional Scale of Perceived Social Support (MSPSS), a theoretically driven instrument that is widely used in research and practice. This instrument consists of three factors (Family, Friends and Significant Others). It has been tested on several populations, specifically on students, teachers, pregnant women, healthy older adults and psychiatric patients, from various countries. However, to our knowledge, only three existing studies have tested the psychometric characteristics of MSPSS on patients affected by chronic conditions (HF [19] and stroke [20]) and patients with an implantable cardioverter defibrillator (ICD) [11].

The study conducted on a sample of 446 ICDs patients [11], which used principal component analysis with varimax rotation, showed the same original three-factor structure with the factors of Family, Friends and Significant Others. Convergent and divergent validity were supported in this study, with significant correlations being found between the Crisis Support Scale (correlations from 0.40 to 0.61, $p < 0.001$) and the Hospital Anxiety and Depression Scale (correlations from 0.40 to 0.61, $p < 0.001$). Reliability, which was tested with Cronbach's alpha, was 0.94 for the total scale.

The same results were obtained by testing the MSPSS validity in HF patients, and they confirmed the three-factor structure with the factors of Family, Friends and Significant Others [19]. In this study, construct validity was tested through hypothesis testing, which showed a significant relationship between the MSPSS scores and depressive symptoms. Reliability, which was tested with Cronbach's alpha, was supported in this study (0.94).

Only one study on patients with chronic diseases tested the factorial validity of the MSPSS with confirmative factor analysis (CFA), which is considered the best approach for testing theoretically driven instruments such as the MSPSS [20]. This study was conducted solely on 140 stroke patients [20] and tested both two-factor and three-factor structures of the MSPSS, and it showed better fit indices for the two-factor model than for the three-factor model. Concurrent validity was not tested in this study. Reliability, which was tested with Cronbach's alpha, was 0.78 for the total scale. Reliability was supported with a test-retest and the kappa coefficient, which ranged from 0.67 to 1.

In conclusion, although several studies have tested the psychometric characteristics of the MSPSS, only three have tested this scale in patients with chronic diseases, and only one has tested its factorial structure with CFA and resulted in better fit indices for the two-factor model than the three-factor model. As psychometrically sound instruments are important for research and practice, this limited knowledge of the factorial structure of the MSPSS in patients with chronic diseases represents a gap in the existing literature. Therefore, this study aimed to test the psychometric characteristics (factorial structure, concurrent validity and internal consistency reliability) of the MSPSS in a sample of patients with chronic diseases, such as HF, COPD, DM and PD.

MATERIALS AND METHODS

Design

We used a cross-sectional study design.

Setting and sample

A convenience sample of patients with chronic diseases was recruited in inpatient and outpatient settings from eight different regions of Italy. The patient inclusion criteria were as follows: a) 18 years of age or older; b) a minimum of one-year diagnosis of one of the following chronic diseases: HF, COPD, DM or PD; and c) ability to read and understand the Italian language. The patient exclusion criterion was a diagnosis of dementia or severe cognitive impairment after an evaluation with the Montreal Cognitive Assessment test [21] that resulted in a score of equal to or less than 18.

Instruments

The MSPSS [22] consists of 12 items that are grouped into three factors: Family (items 3, 4, 8 and 11), Friends (items 6, 7, 9 and 12) and Significant Others (items 1, 2, 5 and 10). The respondents were asked to indicate their level of agreement to each item by using a seven-point Likert scale ranging from 1 "very strongly disagree" to 7 "very strongly agree". The scores of each subscale and the total scale ranged from 1 to 7, with higher scores indicating higher perceived social support. The Italian version of the MSPSS was translated by Prezza and Principato [23] following the backward-forward translation method, and later validated through CFA on 382 university students confirming the original three-factor structure [24].

The 36-item Short Form Health Survey (SF-36) [25] is a self-administered instrument used to assess QOL using the following eight scales: physical functioning (PF), role physical (RP), bodily pain (BP), general health (GH), role emotional (RE), vitality (VT), mental health (MH) and social functioning (SF). The SF-36 is widely used to measure QOL in patients with chronic diseases [26, 27]. The validity and reliability of the Italian version of the SF-36 were tested in a previous study [28]. The scores of each SF-36 scale ranged from 0 to 100, with higher scores indicating better QOL. As the literature showed that social support influences the quality of life in all the considered chronic diseases, the SF-36 was used to test the construct validity.

The socio-demographic and clinical characteristics of the participants were collected using an ad hoc questionnaire. Socio-demographic data included gender, age, region of residence, marital status, level of education, employment status (employed or unemployed/retired) and living conditions (living with others or alone).

The clinical data included disease stage (e.g., New York Heart Association Functional Classification for HF) and comorbidity evaluated using the Charlson comorbidity index (CCI) [29]. This instrument evaluates the number and the severity of 19 comorbid conditions, assigning a score from 1 to 6 for each condition. CCI scores range from 0 to 37, with higher scores indicating more comorbid conditions.

Data collection

The study participants were recruited according to the inclusion and exclusion criteria by trained research assistants who had identified eligible inpatients and outpatients from different healthcare institutions. Potential participants were provided with detailed information about the study and then invited to participate. Data collection was initiated only after the patients had signed an informed consent form.

Ethical consideration

The study received approval from the ethics committee of the university hospital that coordinated the study. The study's research assistants ensured that participation in the study was voluntary and that data would be collected, analysed and reported under the strictest confidentiality. A written informed consent was obtained from all participants included in the study.

Analysis

Descriptive statistics (mean, frequency, percentage and standard deviation [SD]) were used to describe the clinical and sociodemographic characteristics of the participants. Skewness and kurtosis were used to evaluate the normality of the MSPSS items [30].

CFA was used to test the dimensionality of the MSPSS with the three-factorial structure of Family, Friends and Significant Others. As these three factors are theoretically included under a wider second-order factor, specifically social support, we also tested the factorial structure with the three first-order factors (Family, Friends and Significant Others) and a second-order factor that included the above three factors. CFA was conducted using the maximum likelihood robust estimator to account for the non-normal distribution of the items [31]. To evaluate the adequacy of the tested model, the following fit indices were considered: confirmatory fit index (CFI) [32] and the Tucker-Lewis index (TLI) [33], in which the values of equal to or greater than 0.95 indicate an excellent fit; standardized root mean square residual (SRMR), in which the values of equal to or less than 0.08 indicate a good fit; and root mean square error of approximation (RMSEA), in which the values of less than 0.06 indicate a good fit. Traditional chi-square statistics were reported. The concurrent validity of the MSPSS was evaluated by correlating the MSPSS factor scores with

the SF-36 scale scores. Correlations were performed with Pearson's r .

The internal consistency reliability of MSPSS was assessed with the Cronbach's alpha coefficient for each subscale and for the overall scale. A coefficient greater than 0.70 indicates acceptable internal consistency, and a coefficient greater than 0.80 indicates good internal consistency [34]. The internal consistency of the factor solution was also evaluated with the factor score determinant coefficient, which represents the correlation between the true and the estimated factor scores. The factor score determinant coefficient ranges from 0 to 1 and describes how well the factor is measured (Muthén, 1998-2017). The larger the coefficient is (≥ 0.70), the more stable and reliable are the factors identified through factor analysis [35]. As the MSPSS is a multidimensional scale, the internal consistency reliability was also evaluated with the model-based internal consistency index [36], which is an estimate of reliability for use in case of multidimensional or complex (primary- and second-order factors) scales, as the MSPSS has been hypothesised to be theoretically composed of three factors. A p value of equal to or less than 0.05 was considered statistically significant. Statistical analyses were conducted using Mplus version 7 [31] and IBM® SPSS® Statistics V22.

RESULTS

Clinical and sociodemographic characteristics of the participants

A total of 236 patients participated in the study, and were enrolled in seven regions of Central (77.5%) and Southern (22.5%) Italy. Nearly 81% were recruited in medical and surgical wards and the remaining patients in ambulatories of geriatrics, cardiology, endocrinology, and for chronic illnesses. Among the eligible patients, 32 refused to participate due to lack of time ($n = 20$) or interest ($n = 12$).

The mean age of the patients was 69 years (range: 24-92), with 69.5% of the sample aged 65 years or over, and 54% of the patients were male. Nearly 57% of the patients were married, and 28% were widowed. About 61% of the patients had elementary or middle school education. At least 13% of the sample was affected by HF, 30% by COPD, 53% by DM and 4% by PD. The mean CCI score was 3.4. Most of the participants were inpatients during the study (81%) (Table 1).

Item descriptive analysis

Table 2 shows the SD, mean, skewness and kurtosis of the MSPSS items. Not all of the items were normally distributed, with eight showing a skewness index of greater than |1| and seven showing a kurtosis index of greater than |1|. All of the items had a mean score that was higher than the average value of four, which indicates good perceived social support. The lowest values were for the four factor items of friends.

MSPSS validity

CFA testing of the three-factor structure of Family, Friends and Significant Others yielded the following adequately fit indices: $\chi^2(51) = 91.69$, $p < 0.001$, CFI

Table 1
Sociodemographic and clinical characteristics of the sample (n = 236)

Variables	Mean	SD
Age	69.2	13.9
CCI	3.39	2.18
Year since diagnosis	11.11	7.89
Age classes	n	%
≤ 64	72	30.5
65-75	69	29.2
≥ 76	95	40.3
Year since diagnosis classes		
≤ 5	71	30.1
6-10	75	31.8
≥ 11	90	38.1
Gender		
Male	128	54.2
Female	108	45.8
Education		
None	16	6.8
Elementary School	77	32.6
Middle school	67	28.4
High school	63	26.7
University degree	13	5.5
Living conditions		
Live alone	42	17.8
Live with others	194	82.2
Occupation		
Retired/unemployed	140	59.3
Employed	96	40.7
Origin		
Central Italy	183	77.5
Southern Italy	53	22.5
Diagnosis		
HF	31	13.1
COPD	70	29.7
DM	125	53.0
PD	10	4.2
Setting		
Outpatients	45	19.1
Inpatients	191	80.9
Severity diseases		
<i>Heart failure</i> (NYHA class)		
I	14	45.2
II	8	25.8
III	8	25.8
IV	1	3.2
<i>COPD</i> (mMRC grade)		
0	14	20.0
1	13	18.6
2	16	22.9
3	21	30.0
4	6	8.6
<i>Diabetes</i>		
Insulin treatment	40	32.0
Oral treatment	66	52.8
Insulin and oral treatment	19	15.2
<i>Parkinson's disease</i> (Hoehn and Yahr Stage)		
nr	3	30
1	3	30
2	4	40

CCI: Charlson comorbidity index; HF: heart failure; COPD: chronic obstructive pulmonary disease; DM: diabetes mellitus; PD: Parkinson's disease; mMRC: modified Medical Research Council; NYHA: New York Heart Association; SD: standard deviation; nr: not reported.

= 0.97, TLI = 0.96, RMSEA = 0.058 (90% Confidence Interval CI = 0.038-0.077) and SRMR = 0.04. All the factor loadings were equal to or greater than 0.79 and significant. As the three factors are theoretically considered to be factors of social support, a second-order factor was specified (Fig. 1). The fit indices of this re-specified model were exactly the same as the three-factor model specified above.

Table 3 presents the concurrent validity that was performed by correlating the MSPSS scores with the SF-36 scale scores. The Family factor score of MSPSS was significantly and positively correlated only with the SF-36 scale score for VT. The Friends factor score of the MSPSS was significantly and positively correlated with all of the SF-36 scale scores. The Significant Others factor score of the MSPSS was positively and significantly correlated with the scale scores of PF and VT. The total MSPSS score was positively and significantly correlated with all of the SF-36 scale scores except for the RE scale score.

People with chronic disease living with family showed higher scores than people living alone in the Family (5.91 vs 5.27, $p < 0.001$) and Significant Others (5.93 vs 5.08, $p < 0.001$) support subscales and in the total scale (5.36 vs 4.92, $p = 0.008$). This finding shows consistency between the perceived social support and the objective measures of actual support.

MSPSS reliability

Cronbach's alpha was 0.92 for the Family factor, 0.96 for the Friends factor, 0.93 for the Significant Others factor and 0.91 for the entire scale, showing an excellent internal consistency. The factor score determinant coefficient was 0.97 for the Family factor, 0.98 for the Friends factor, 0.97 for the Significant Others factor and 0.89 for the entire scale. The internal consistency for the second-order factor structure, which was estimated with Bentler's model-based internal consistency, showed a high coefficient of 0.97 in the MSPSS. This result supports the use of scores for each factor and the combined scores of the 12 items of the MSPSS.

DISCUSSION

To our knowledge, this study was the first to test the psychometric properties of the MSPSS in Italians with chronic diseases and the second study to test the three theoretical factors of the MSPSS with CFA in patients with chronic diseases. Although CFA is considered the best approach for testing theoretically driven instruments such as the MSPSS, only one study [20] used the CFA to test this instrument to date.

The results of our analysis showed that the three-factorial structure of the MSPSS, with the factors of Family, Friends and Significant Others, fit the data in our population of interest well. In the literature, the MSPSS factorial structure showed mixed results in patients affected by chronic diseases. A three-factor structure was determined with the exploratory factor analysis in HF and ICD patients [11], whereas both two- and three-factorial structures were tested and showed a better fit than the two-factor solution in stroke patients [20]. These mixed results in the MSPSS factorial structure

Table 2
Descriptive Analyses of MSPSS Items (n = 236)

MSPSS item		Mean	SD	Skewness	Kurtosis
1 SO	There is a special person who is around when I am in need	5.85	1.29	-1.70	3.08
2 SO	There is a special person with whom I can share my joys and sorrows	5.80	1.32	-1.34	1.51
3 FAM	My family really tries to help me	5.89	1.13	-1.40	2.66
4 FAM	I get the emotional help and support I need from my family	5.77	1.18	-1.24	1.92
5 SO	I have a special person who is a real source of comfort to me	5.75	1.32	-1.16	0.97
6 FR	My friends really try to help me	4.29	1.64	-0.41	-0.57
7 FR	I can count on my friends when things go wrong	4.20	1.64	-0.43	-0.59
8 FAM	I can talk about my problems with my family	5.68	1.24	-1.43	2.49
9 FR	I have friends with whom I can share my joys and sorrows	4.36	1.63	-0.39	-0.46
10 SO	There is a special person in my life who cares about my feelings	5.7	1.24	-1.38	2.02
11 FAM	My family is willing to help me make decisions	5.83	1.12	-1.17	1.89
12 FR	I can talk about my problems with my friends	4.26	1.64	-0.43	-0.53

FAM: family; FR: friends; SO: significant others; MSPSS: multidimensional scale perceived social support; SD: standard deviation.

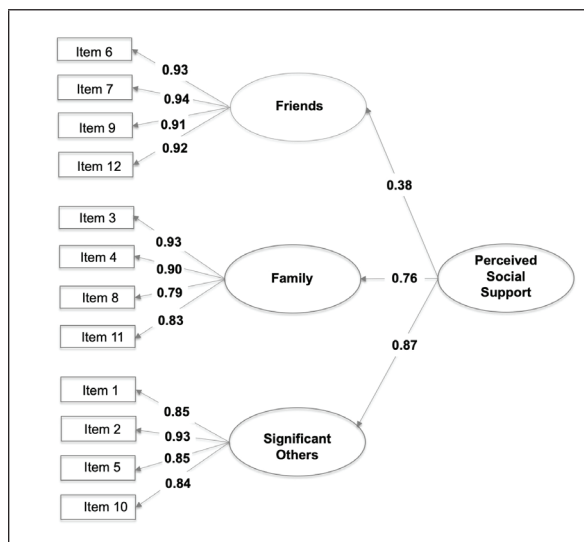


Figure 1
Confirmative factor analysis of the Multidimensional Scale of Perceived Social Support.

emphasise the importance of testing the scale on specific populations before using it for clinical and research purposes. In fact, in several psychometric studies [37, 38], investigators who used the MSPSS commented that social support is influenced by the cultural context, and consequently, the MSPSS factorial structure should be tested in a specific population before using the MSPSS in research and clinical practice. For example, in some Eastern cultures, the Family and Friends factors converged into a single factor. The investigators explained that in their culture, family and friends are close [37]. In addition, in a study conducted on Nigerian stroke patients, a two-factor model (the Family and Significant Others factors formed a single factor) fit the data better than a three-factor model [20]. In our sample, the three-factor structure was justified by the

Table 3
Scores and correlations among the MSPSS factors

	FAM	FR	SO	Total MSPSS
PF SF-36	0.09	0.36***	0.14*	0.30***
RP SF-36	0.04	0.30***	0.12	0.24***
BP SF-36	0.08	0.20**	0.08	0.18**
GH SF-36	0.02	0.23***	0.11	0.18**
VT SF-36	0.15*	0.24***	0.22**	0.27***
SF SF-36	0.06	0.22**	0.07	0.19**
RE SF-36	-0.03	0.20**	0.02	0.11
MH SF-36	0.12	0.17**	0.11	0.17**

*** p < 0.001; ** p < 0.01; * p < 0.05

FAM: Family; FR: Friends; SO: Significant others; MSPSS: Multidimensional scale perceived social support; PF SF-36: Physical functioning; RP SF-36: Role physical; BP SF-36: Bodily pain; GH SF-36: General health; VT SF-36: Vitality; SF SF-36: Social functioning; RE SF-36: Role emotional; MH SF-36: Mental health.

fact that in Italy, similar to other Western countries, the factors of Family and Significant Others are typically distinct [39, 40].

In this study, we also tested a model with a second-order factor. This model fit the data well and made the MSPSS stronger from the theoretical and practical points of view. From a theoretical point of view, the three factors of Family, Friends and Significant Others belonged to the higher factor of social support because the second-order factor fit the data well. From a practical point of view, having a reliable second-order factor enables the consideration of the overall score when assessing the perceived level of support that a person receives from the general social network, and the subscale scores can be used for a finer-grained evaluation on the source of social support (i.e. family, friends or significant others). To our knowledge, no existing study

of people with chronic diseases has tested and specified a factorial structure with a second-order factor for the MSPSS.

In this study, we tested the construct validity of the MSPSS with the SF-36 subscales. Although we expected to find the significant correlation between the three MSPSS factors and the SF-36 subscales, we obtained mixed results. For example, the Family factor significantly correlated only with the VT subscale, the Friends factor correlated with all of the SF-36 subscales, the Significant Others factor correlated with only the PF and VT subscales and the total MSPSS scale correlated with all of the SF-36 subscales except the RE subscale. These findings are difficult to interpret because previous studies that correlated the MSPSS with the SF-36 in chronic diseases examined the total MSPSS score rather than the scores of each factor. To determine the factors affecting the quality of patient outcomes, social support along with each individual factor should be measured. For example, the current study revealed that family support appeared to affect VT but not the other dimensions of QOL.

Our study revealed that the internal consistency reliability of the MSPSS is supported. We tested reliability with conventional methods, such as Cronbach's alpha and internal consistency reliability, in addition to more innovative methods such as the model-based internal consistency index. Barbaranelli, Lee, Vellone and Riegel [41] suggested that with multidimensional scales, such as the MSPSS, Cronbach's alpha might not be the best method for testing reliability. Nevertheless, the Cronbach's alpha of the three factors and the entire scale was greater than 0.91, which indicates that the reliability of the total scale and the MSPSS factors was excellent. The supportive internal consistency reliability was also confirmed by the factor score determinacy coefficient, which resulted in values that were even higher than those of Cronbach's alpha. By testing multidimensional reliability with the model-based internal consistency index, we found that estimating the total score of the MSPSS was psychometrically appropriate. To our knowledge, this study is the only one to use an alternate estimate of reliability with the MSPSS, further supporting the strong reliability of the tool.

Several studies demonstrated that social support is important during the treatment of chronic conditions because it improves patient outcomes. For example, in HF patients, social support was proved to enhance their QOL, improve the prognosis of the disease and reduce its incidence, prevalence and mortality. In addition, high levels of social support were correlated with better self-care in patients with both HF [42] and DM [43]. For other conditions, such as HIV [44] and chronic illnesses in the elderly [45], social support was found to facilitate problem solving, positive emotions and the reduction of negative ones [46]. In terms of behaviours, social support reduced the risk factors by promoting healthier lifestyles (better diet, less smoking, etc.) and the need for medical care. Moreover, social support was proved to improve adherence to treatment [47].

Limitations and strengths

This study has several limitations. The first limitation is that our sample was not homogeneous in terms of the enrolled patients. However, this limitation could also be considered a strength because the psychometric characteristics of the MSPSS have been proven to be unaffected by it. The second limitation is that we used a cross-sectional study with a convenience sample that included only four chronic diseases. Consequently, the results of this study could promote generalised precautions to patients who are affected by other chronic diseases.

This study also has several strengths. First, it enriches the growing body of literature describing the psychometric evaluation of the MSPSS in people with chronic diseases. Second, better methods (i.e. CFA) were used to evaluate the psychometric characteristics of theoretically driven instruments such as the MSPSS and the reliability.

CONCLUSIONS

The results of this study indicated that the MSPSS is a valid and reliable instrument that could be used to measure the perception of social support in people with chronic diseases. In accordance with previous studies, the original three-dimensional model of the MSPSS was confirmed, and its internal consistency proved to be excellent for both the total score and the scores of the three subscales [48, 49].

Implication

Our study demonstrates that the MSPSS is valid and reliable and can certainly be used in clinical practice and research to measure the perceived social support in patients affected by chronic disease. As social support is a multidimensional construct, using each individual dimension score rather than the total global score is advisable when clinicians want to identify the source of the social support that patients receive. For example, when the perceived social support from family is identified to be poor, healthcare professionals can tailor interventions to promote other forms of support, such as voluntary services, or create activities of social aggregation and sharing. By contrast, in cases of high social support from family, clinicians can consider the possible burden of the family derived from the continuous support of the care receiver.

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Conflict of interest statement

There are no potential conflicts of interest or any financial or personal relationships with other people or organizations that could inappropriately bias conduct and findings of this study.

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