

Retesting the Reliability and Factor Structure of PSSQ-29

Georgios Pilafas^{1,2}, Georgios Lyrakos¹, Penelope Louka^{1,3}

¹Accredited Lecturer in Psychology, University of Derby (UK) at Mediterranean College, Athens, Greece

²Programme Leader 'Bsc (Hons) Applied Psychology', University of Derby (UK) at Mediterranean College, Athens, Greece

³Associate Provost (Research), Mediterranean College, Greece

Corresponding Author: Georgios Pilafas

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ABSTRACT

The 'Psycho-Somatic Screening Questionnaire - 29' (PSSQ-29) was initially introduced in 2020 in order to serve as a self-reported tool that may measure both mental and somatic symptoms in a research protocol in Greece regarding the impact of COVID-19. PSSQ-29 was then used in two more studies with different populations and conditions. Therefore, the aim of the present study is to test and present the reliability and factor structure of PSSQ-29 after performing an analysis on all data. In this study the dataset of three previous studies was used to answer the research questions. The only tool that was analysed is PSSQ-29 and its individual items for providing Cronbach's alpha scores, internal-consistency, factor structure and factor loadings in each sample of the three studies. The results show that the Cronbach's alpha scores range between .955 and .959, while regardless of how many factors were presented in the exploratory factor analysis the items were predominantly loaded into one factor suggesting that PSSQ-29 is likely measure only psychosomatic symptoms as one entity as the initial article that introduced the questionnaire supports. Lastly, a great limitation to this study is that although there are datasets from three different studies, the samples consist of Greek participants and the original data collection was performed throughout the COVID-19 era in Greece.

Keywords: Psycho-Somatic Screening Questionnaire – 29; PSSQ-29; Psychosomatics; Self-reported Measure

INTRODUCTION

The present study aims to retest and present the reliability and the factor structure of the self-reported questionnaire 'Psycho-Somatic Screening Questionnaire - 29' (PSSQ-29). PSSQ-29 was introduced as a self-reported tool that contains both mental and somatic symptoms in a questionnaire (Pilafas et al., 2021a, 2021b). The development of this self-reported measure was based on the idea that mental and somatic disorders are one entity (Pilafas et al., 2021a). PSSQ-29

consists of 29 items and asks the individual to answer in a Likert scale the tense they experience some behaviours that are related to mental, cognitive, affect and somatic symptoms (Pilafas et al., 2021a).

As the developing team interpreted, the 10th version of the International Classification of Diseases (ICD-10; World Health Organization [WHO], 2019) and the Encyclopedia of Behavioral Medicine (Gellman & Turner, 2013) discuss stress based on Hans Selye (1956) and the works

of Richard Lazarus (Lazarus & Folkman, 1984), hence why any psychosomatic symptom may be a comorbid condition between mental, cognitive, affect and somatic symptoms. However, if this is the case with PSSQ-29, it is commonly supported that self-reported measures that are based on stress and behavioural conditions are more likely to show great limitations (de Witte et al., 2021; Frazier & Kaler, 2006).

To proceed to this study, it may be useful to report if PSSQ-29 shows the same scores and factors in different studies. Such a question may be addressed under the following conditions. Firstly, the question might be answered by retesting the reliability of PSSQ-29 as a new self-reported measure in behavioural sciences. This may provide an early, but rather clear, indication of whether the tool tends to reliable or not. In case any tool is reported reliable in a single study, it is quite debatable whether any use of it in another population or under other conditions show the same reliability results (Montag et al., 2022). Secondly, any self-reported measure with a large pool of items may present issues with inter-item correlation (Field, 2017). Practically, more than one item within the questionnaire may measure the same thing or be completely irrelevant to each other. Again, if a self-reported measure shows a good result in a single study, this might be not achievable in another study with other conditions and a different population (Field, 2017). Thirdly, new questionnaires with a large number of items tend to have more than one factor. In the case of PSSQ-29 the initial paper that introduced the measure concluded that there is only one factor (Pilafas et al., 2021a). A good practice for a new questionnaire might be to test in different populations and conditions if the factor loading remains the

same, or if there are any major changes in the analysis (de Witte et al., 2021; Field, 2017; Frazier & Kaler, 2006). What is more, retesting a new questionnaire for its reliability and factor structure in different studies with different populations and conditions provide evidence in favour or against the use of the self-reported tool in question by increasing or decreasing the credibility of the initial findings and provide more robust evidence to support the use of the questionnaire in the foreseeable future (Field, 2017).

Considering the above, the aim of the study is to test the reliability and factor structure of the questionnaire PSSQ-29, with a view to presenting to the scientific community and to field practitioners whether they can use the tool in their practice as a valid and reliable questionnaire.

MATERIALS & METHODS

Participants

In this study samples of three independent studies were used. All three samples consist of Greek participants. The first two samples come from the general Greek population, while the third one consists exclusively of health professionals. PSSQ-29 in first two cases was electronically distributed and in the third case PSSQ-29 was distributed in hard copies. All questionnaires were in Greek, and therefore participants were electronically literate and were able to understand and provide answers in the Greek language.

The sample from the first study derives from the study that originally presented the questionnaire (Pilafas et al., 2021a). It is noteworthy that at the time of data collection there was the first wave of COVID-19. The average age is found at 40.51 (SD= 12.83) with a range between 18 and 78. Details of the demographics of this sample are provided below in Table 1.

Table 1. Demographic details of the participants of the study.

Main Variable	Variable's Subcategories	Total (%) N = 1,158 ^a	Males (%) n = 280, (24.2%)	Females (%) n = 876, (75.6%)	Missing
Education					-
	School Level, (%)	399, (34.5%)	110, (39.3%)	289, (33%)	
	Undergraduate Degree, (%)	402, (34.7%)	85, (30.35%)	316, (36.1%)	
	Postgraduate Degree, (%)	357, (30.9%)	85, (30.35%)	271, (30.9%)	
Marital Status					-
	Single, (%)	299, (25.8%)	111, (39.6%)	188, (21.5%)	
	In relationship, <5 years, (%)	123, (10.6%)	21, (7.5%)	101, (11.5%)	
	In relationship, >5 years, (%)	74, (6.4%)	17, (6.1%)	56, (6.4%)	
	Married, (%)	508, (43.9%)	101, (36.1%)	407, (46.5%)	
	Separated, (%)	25, (2.2%)	2, (0.7%)	23, (2.6%)	
	Divorced, (%)	113, (9.8%)	27, (9.6%)	86, (9.8%)	
	Widowed, (%)	16, (1.4%)	1, (0.4%)	15, (1.7%)	
Children					-
	None, (%)	527, (45.5%)	157, (56.1%)	368, (42%)	
	1, (%)	201, (17.4%)	44, (15.7%)	157, (17.9%)	
	2, (%)	348, (30.1%)	67, (23.9%)	281, (32.1%)	
	3, (%)	69, (6%)	9, (3.2%)	60, (6.8%)	
	≥ 4, (%)	13, (1.1%)	3, (1.1%)	10, (1.1%)	
Occupation					-
	Unemployed, (%)	84 (7.3%)	13, (4.6%)	71, (8.1%)	
	School & University Student, (%)	163 (14.1%)	48, (17.6%)	114, (13%)	
	Self-Employed/Freelancer, (%)	142 (12.3%)	35 (12.5%)	107, (12.2%)	
	Public Servant, (%)	214 (18.5%)	57, (20.4%)	157, (17.9%)	
	Employee at the private sector, (%)	315 (27.2%)	73, (26.1%)	242, (27.6%)	
	Health Professional, (%)	133 (11.5%)	29, (10.4%)	103, (11.8%)	
	Security & Armed Forces, (%)	9 (0.8%)	5, (1.8%)	4, (0.5%)	
	Rentier/Landlord, (%)	13 (1.1%)	1, (0.4%)	12, (1.4%)	
	Retired, (%)	76 (6.6%)	16, (5.7%)	60, (6.8%)	
	Disability Pension, (%)	9 (0.8%)	3, (1.1%)	6, (0.7%)	
Income^b					1 ^c
	≤ 10,000 €, (%)	379, (32.8%)	67, (24%)	310, (35.4%)	
	10,001 – 20,000 €, (%)	401, (34.7%)	118, (42.1%)	283, (32.3%)	
	20,001 – 30,000 €, (%)	174, (15%)	44, (15.7%)	130, (14.8%)	
	≥ 30,001 €, (%)	203, (17.5%)	50, (17.9%)	153, (17.5%)	
Residence					-
	Athens, (%)	934, (80.7%)	237, (84.6%)	695, (79.3%)	
	Thessaloniki, (%)	24, (2.1%)	3, (1.1%)	21, (2.4%)	
	Rest Mainland Greece, (%)	118, (10.2%)	27, (9.6%)	91, (10.4%)	
	Greek Islands, (%)	66, (5.7%)	11, (3.9%)	55, (6.3%)	
	Other, non specified, (%)	16, (1.4%)	2, (0.8%)	14, (1.6%)	

Notes:
^a Out of the 1,158 participants 2 of them (0.2%) did not declare their gender
^b This variable shows the amount of the total annual income in the household after the contribution of all members
^c The single missing case was located in the men's group

The second sample from this study comes from a relevant study in which the researchers used PSSQ-29 to measure the level of psychosomatic health during the second wave of COVID-19 (Pilafas &

Lyrakos, 2021). The average age is found at 33.7 (SD= 12.16) with a range between 18 and 67. Details of the demographics of this sample are provided below in Table 2.

Table 2. Summary of socio-demographic details of the participants of the study.

Main Variable	Variable's Subcategories	Total (%) N ^a = 192	Males (%) n = 51, (26.6%)	Females (%) n = 141, (73.4%)	Missing Answers (%)
Education^b					-
	School Level, (%)	59, (30.7%)	13, (25.5%)	46, (32.6%)	
	Bachelor's Degree, (%)	83, (43.2%)	27, (52.9%)	56, (39.7%)	
	Master's Degree, (%)	45, (23.4%)	10, (19.6%)	35, (24.8%)	
	Doctorate Degree (%)	5, (2.6%)	1, (2%)	4, (2.8%)	
Marital Status					-
	Single, (%)	67, (34.9%)	26, (51%)	41, (29.1%)	
	In relationship, <5 years, (%)	44, (22.9%)	12, (23.5%)	32, (22.7%)	
	In relationship, >5 years, (%)	14, (7.3%)	2, (3.9%)	12, (8.5%)	
	Married, (%)	54, (28.1%)	11, (21.6%)	43, (30.5%)	
	Divorced, (%)	10, (5.2%)	-	10, (7.1%)	
	Widowed, (%)	3, (1.6%)	-	3, (2.1%)	
Children					-

	None, (%)	133, (69.3%)	43, (84.3%)	90, (63.8%)	
	1, (%)	20, (10.4%)	2, (3.9%)	18, (12.8%)	
	2, (%)	29, (15.1%)	4, (7.8%)	25, (17.7%)	
	3, (%)	10, (5.2%)	2, (3.9%)	8, (5.7%)	
Occupation					-
	Unemployed, (%)	15 (7.8%)	1, (2%)	14, (9.9%)	
	School & University Student, (%)	51 (26.6%)	16, (31.4%)	35, (24.8%)	
	Self-Employed/Freelancer, (%)	21 (10.9%)	8 (15.7%)	13, (9.2%)	
	Public Servant, (%) ^c	21 (10.9%)	8, (15.7%)	13, (9.2%)	
	Health Professional, (%)	22 (11.5%)	2, (3.9%)	20, (14.2%)	
	Employee at the private sector, (%)	43 (22.4%)	13, (25.5%)	30, (21.3%)	
	Rentier/Landlord, (%)	2 (1%)	-	2, (1.4%)	
	Retired, (%)	8 (4.2%)	1, (2%)	7, (5%)	
	Disability Pension, (%)	5 (2.6%)	-	5, (3.5%)	
	Other occupation, non specified (%)	4 (2.1%)	2, (3.9%)	2 (1.4%)	
Income^d					-
	≤ 10,000 €, (%)	73, (38%)	18, (35.3%)	55, (39%)	
	10,001 – 20,000 €, (%)	68, (35.4%)	17, (33.3%)	51, (36.2%)	
	20,001 – 30,000 €, (%)	25, (13%)	6, (11.8%)	19, (13.5%)	
	≥ 30,001 €, (%)	26, (13.5%)	10, (19.6%)	16, (11.3%)	-
Residence					-
	Athens, (%)	169, (88%)	47, (92.2%)	122, (86.5%)	
	Rest Mainland Greece, (%)	7, (3.6%)	2, (3.9%)	5, (3.5%)	
	Greek Islands, (%)	4, (2.1%)	-	4, (2.8%)	
	Other, non specified, (%)	12, (6.3%)	2, (3.9%)	10, (7.1%)	

Notes:
^a N= total amount of participants
^b Participants were asked to declare the level of the education, as this had already been achieved
^c Health professionals consist of a sample of health employees and interns at the General Public Hospital of Nikaia ‘Ayios Panteleimon’ in Athens, Greece
^d Participants were asked to declare the level of their income, based on the total annual household income and not based on their individual earnings and contribution to the household expenditures.

The third sample that was used in this study was retrieved from a study that provided a behavioral intervention to 48 health professionals during the second wave of COVID-19 as a response to their increased stress levels. It is noteworthy that the study

is under preparation for submission. The average age is found at 36.1 (SD= 12.66) with a range between 22 and 61. Details of the demographics of this sample are provided below in Table 3.

Main Variable	Variable's Subcategories	Total (%) N ^a = 48	Males (%) n = 11, (22.9%)	Females (%) n = 37, (77.1%)	Missing Answers (%)
Education^b					-
	School Level, (%)	11, (22.9%)	3, (27.3%)	8, (21.6%)	
	Bachelor's Degree, (%)	26, (54.2%)	7, (63.6%)	19, (51.4%)	
	Master's Degree, (%)	11, (22.9%)	1, (9.1%)	10, (27%)	
Marital Status					-
	Single, (%)	17, (35.4%)	6, (54.5%)	11, (29.7%)	
	In relationship, <5 years, (%)	10, (20.8%)	3, (27.3%)	7, (18.9%)	
	In relationship, >5 years, (%)	2, (4.2%)	1, (9.1%)	1, (2.7%)	

	Married, (%)	12, (25%)	1, (9.1%)	11, (29.7%)	
	Divorced, (%)	6, (12.5%)	-	6, (16.2%)	
	Widowed, (%)	1, (2.1%)	-	1, (2.7%)	
Children					-
	None, (%)	30, (62.5%)	9, (81.8%)	21, (56.8%)	
	1, (%)	7, (14.6%)	2 (18.2%)	5, (13.5%)	
	2, (%)	9, (18.8%)	-	9, (24.3%)	
	3, (%)	2, (4.2%)	-	2, (5.4%)	
Occupation^c					-
	Registered Health Professional, (%)	37 (77.1%)	8, (72.7%)	29, (78.4%)	
	Trainee Health Professional, (%)	11 (22.9%)	3, (27.3%)	8, (21.6%)	
Income^d					-
	≤ 10,000 €, (%)	19, (39.6%)	6, (54.5%)	13, (35.1%)	
	10,001 – 20,000 €, (%)	17, (35.4%)	3, (27.3%)	14, (37.8%)	
	20,001 – 30,000 €, (%)	4, (8.3%)	-	4, (10.8%)	
	≥ 30,001 €, (%)	8, (16.7%)	2, (18.2%)	6, (16.2%)	-
Residence					-
	Athens, (%)	48, (100%)	48, (100%)	48, (100%)	

Notes:
^a N= total amount of participants
^b Participants were asked to declare the level of the education, as this had already been achieved
^c Health professionals consist of a sample of health employees and interns.
^d Participants were asked to declare the level of their income, based on the total annual household income and not based on their individual earnings and contribution to the household expenditures.

Materials

In all three samples PSSQ-29 was distributed and answered in Greek. The three independent samples answered at all cases the same questionnaire without any changes. PSSQ-29 consists of 29 items, and it is answered in a Likert scale fashion (Jebb et al., 2021), from 0 to 10 (Pilafas et al., 2021a; Pilafas & Lyrakos, 2021).

Design & Analysis

The present study aimed to test the validity and reliability of PSSQ-29 that comes from three independent samples at different time frames.

Therefore, the due analysis that applies to all self-reported tools was employed in the three different samples independently. This

includes a Cronbach's alpha analysis of the scale (Cronbach, 1951) and an exploratory factor analysis (EFA) with Varimax rotation and an Eigenvalue of 1 (Watkins, 2021).

PROCEDURE

The databases of the later three studies were provided to the authors of this study in order to proceed to the analysis they proposed. The three studies had already granted ethical approval. The analysis was performed on SPSS software.

RESULT

Cronbach's Alpha & Factor Analyses

The analysis of the results for all samples is provided in Table 4 below.

Samples (N)	Cronbach's alpha	Components
Sample 1 (1,158)	.955	4
Sample 2 (192)	.955	4
Sample 3 (48)	.959	7

Note.
 The number of components was analyzed using an exploratory factor analysis with varimax rotation and an Eigenvalue of 1.

Correlation analysis & Item Deletion

Regarding Sample 1 (N= 1,158) and 2 (N= 192) the between-items internal correlation analysis showed that no relations between items present an r value from $\pm.9$ to ± 1 and below $\pm.1$ in both samples. Furthermore, the analysis shows that Cronbach's alpha value does not increase if an item is to be deleted. The exception comes from Study 3 (N= 48). The r values between some items are all less than $\pm.1$. More specifically, between item 18 and items 5 is shown at $-.013$. What is more, item 23 seems to have low value with item 1 ($r= .041$), item 10 ($r= .072$), item 11 ($r= .047$), item 12 ($r= .016$), item 18 ($r= .015$) and item 21 ($r= .072$). As a result, the analysis in this case only shows that if items 18 or 23 are deleted the Cronbach's alpha of PSSQ-29 increases from $.959$ to $.960$. Those results indicate that the two items might be irrelevant to the questionnaire at this sample (Field 2017). However, since this did not appear at any other analysis with the rest samples, it is hypothesized that the result reflects only Sample 3.

The above results suggest a high reliability ratio of PSSQ-29 in all analyses since in all cases the α ranges between $.955$ and $.959$.

Factor Loading

An EFA analysis with Varimax rotation and an Eigenvalue of 1 was performed to show the components of PSSQ-29 pending on each sample.

In Sample 1, as in the original paper (Pilafas et al., 2021a) the analysis shows 4 factors. However all items are loaded predominantly in factor 1. In Sample 2, the analysis presents the same results since there are 4 factors and all items again tend to load more to factor 1.

The exception comes again from Sample 3, in which there are 7 components according to the analysis. However, all items tend to show the highest loading score on factor 1 ranging from $.481$ to $.853$, apart from item 23 which shows to load more on factor 2, as $.416$, and on factor 3, as $.437$.

The above results are likely to support the initial idea that PSSQ-29 has only one factor

that is interpreted as the psychosomatic symptoms (Pilafas et al., 2021a).

DISCUSSION

The aim of the present study was to retest the reliability and factor structure of PSSQ-29 in order to answer whether the questionnaire tends to be reliable or not at this early stage of use and development. In order to answer the question, the reliability of PSSQ-29 as much as the factor loadings were tested in three individual samples that answered the questionnaire for three different studies at different time frames. Statistical analysis was performed on all samples to answer the research question.

The results of this study indicate that PSSQ-29 shows a high reliability in all samples. The questionnaire is likely to be reliable and shows high score on the relevant test. In support, the level of reliability is identical between sample 1 and 2, while it is a little higher in the third sample. The factors of the questionnaire are 4 in the two samples, and in the third sample were found to be 7. Though, all items of the questionnaire tend to support the first factor. As a result, regardless of having 29 items, PSSQ-29 tends to have only one factor as the authors of the original paper that introduced the questionnaire discussed (Pilafas et al., 2021a).

Considering any comparisons with the results of previous studies, it is quite evident that there are no comparable data. PSSQ-29 was initially designed to serve as a self-reported measure of psychosomatic symptoms for an epidemiological study in Greece (Pilafas et al., 2021a, 2021b; Pilafas & Lyrakos, 2021). Therefore, PSSQ-29 has been only used in three studies. As already discussed, the first one introduced the scale (Pilafas et al., 2021a, N= 1,158), the second one used the tool with a view to measure psychosomatic symptoms in the second wave of COVID-19 in Greece (Pilafas & Lyrakos, 2021, N= 192) and the third one used PSSQ-29 to measure psychosomatic symptoms before a behavioral intervention to health professional (N= 48). The later

study is undergoing and under preparation. What is more, the data from the three previously mentioned studies were retrieved and analyzed for the purpose of the present study. Consequently, the only feasible comparison can be drawn only between the results of the three samples which are practically included in this study. If the results of the three samples are to be compared on the level of reliability and factor structure of PSSQ-29, it is evident that PSSQ-29 shows high reliability and standard factors since it tends to have the same results.

As far as the limitations of this study are concerned, the first issue is that the samples were collected during the first and second wave of COVID-19 in Greece. As a result, the levels of PSSQ-29 might have been a little higher than in normal conditions. Secondly, the samples consisted only by Greeks, and thus any outcome of the study may reflect only the case of Greece.

Regarding future studies, it is quite clear that PSSQ-29 was developed and used during the COVID-19 era in Greece. Therefore, it is proposed to researchers to test the reliability and validity of PSSQ-29 in different life and environmental conditions, as well as to adapt the questionnaire into different cultures. What is more, future studies can aim to test if there are any differences between the levels of PSSQ-29 in clinical and non-clinical populations.

CONCLUSION

In conclusion, the present study aimed to answer whether PSSQ-29 is a valid and reliable self-reported tool to measure psychosomatic symptoms. The statistical analysis that was performed in three different samples shows that PSSQ-29 presents a high Cronbach's alpha score, while the questionnaire tends to have only one factor. Initially, PSSQ-29 was developed to measure one factor (psychosomatic symptoms). Indeed, in this study in all three samples the factor analyses show that all items are greatly loaded to one

component although there were 4 to 7 components in the statistical analysis. What is more, the present study indicates that PSSQ-29 tends to be reliable and valid at this early stage of development and use. Some future studies may test if those scores are relevant to other populations with different backgrounds and in different conditions.

Declaration by Authors

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