Review article

The fear of COVID-19 scale: Validation in spanish university students

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ABSTRACT

The emergence of the COVID-19 and its consequences has led to fears, worries, and anxiety among individuals worldwide. Recently, Ahorsu et al. (2020) developed the Fear of COVID-19 Scale (FCV-19S). The present study aimed to translate and validate the FCV-19S in Spanish university students.

The sample comprised 606 Spanish´undergraduates with a mean age of 21.59 years old. We also used a six items from the State Trait Anxiety Inventory (STAI) by van Knippenberg, Duivenvoorden, Bonke & Passchiner (1990).

The Fear of COVID-19 scale used for the present survey evidenced a good alpha measure of internal consistency or reliability analysis with ordinal alpha and ordinal omega. Seven items with acceptable corrected item-total correlation were retained and further confirmed by significant and strong factor loadings. Concurrent validity was supported by the six items of the State Trait Anxiety Inventory (STAI).

The Fear of COVID-19 Scale, a seven-item scale, has a stable unidimensional structure with robust psychometric properties. It is reliable and valid in assessing fear of COVID-19 among the Spanish university students.

1. Introduction

The emergence of a novel form of coronavirus (2019-nCoV), in December 2019, in Wuhan, China, created a confusing and rapidly evolving situation and quickly spread to other provinces/regions of the country and then to whole world (Shigemura et al., 2020; Wang et al., 2020).

On 30 January 2020, the World Health Organization (WHO) declared this disease a 'public health emergency of international concern.' By March 29th, 213 countries/territories had confirmed cases (World Health Organization, 2020a) with an extremely high infection rate and relatively high mortality. As ever in the early stages of a major incident, facts are unclear. We unsure about how many people have caught the disease, the fatality rate, the incubation period, how far it has spread—or how worried or afraid we should be.

For this reason, many countries have implemented of unprecedentedly strict quarantine measures. 'Quarantine is the separation and restriction of movement of people who have potentially been exposed to a contagious disease to ascertain if they become unwell, so reducing the risk of them infecting others (Centers for Disease Control and Prevention, 2017). In Spain, the Spanish government, following the Royal Decree for a state of alarm, ordered a nationwide emergency measure to prevent spreading of the infection. Quarantine started March 14th and will finish May 23rd. In this time, Spanish people self-isolate at home although, from May 10th, with different levels of quarantine across Spain's autonomous communities.

This measure has kept a large number of people in isolation and affected many aspects of their lives (Brooks et al., 2020; Qiu et al., 2020). In fact, many studies have shown the COVID-19 pandemic has caused serious threats to people's physical health and lives such as

feeling anxiety and stress (Dong and Zheng, 2020; DiGiovanni et al., 2004; Hawryluck et al., 2004; Jeong et al., 2016; Liu, 2020; Shigemura et al., 2020; Qiu et al., 2020). This continued anxiety or stress may cause physical functional disorders, including palpitation, chest tightness and insomnia, and further progression may lead to physical and mental diseases, such as anxiety disorders, depression disorders, endocrine disorders and hypertension (Dong and Zheng, 2020;Lee et al., 2005; Shigemura et al., 2020).

Additionally, significant emotional reactions have been found. For instance, anger (Caleo et al., 2018; Cava et al., 2005); grief (Wang et al., 2011) and sadness (Reynolds et al., 2008). One characteristic element of infectious disease compared with other conditions is fear (Ahorsu, et al., 2020; Caleo et al., 2018; DiGiovanni et al., 2004; Jeong et al., 2016; Pan, Chang and Yu, 2005; Pellecchia et al., 2015; Pakpour and Griffiths, 2020; Reynolds et al., 2008; Rubin and Wessely, 2020; Shigemura et al., 2020). Fear is directly associated with its transmission rate and medium (rapidly and invisibly) as well as its morbidity and mortality. With the high levels of fear, individuals may not think clearly and rationally when reacting to COVID-19.

To measure fear of COVID-19 recently, Ahorsu et al. (2020) have developed a brief and valid instrument to capture an individual's fear of COVID-19, beings both timely and important. It has been translated and validated in various cultures and languages (Alyami et al., 2020; Reznik et al., 2020; Sakib et al., 2020; Soraci et al., 2020; Satici et al., 2020).

The main purpose of the present study is to determine the fear of COVID-19 using FCV-19S and to establish the psychometric properties of the scale (FCV-19S) in Spanish´s undergraduates in this time of quarantine. We expect to find good psychometric properties, analyzing the scale's factor structure, reliability and validity. Consequently, using the FCV-19S will provide us with valuable information to determine the level of fear in university population as a result of the COVID-19 pandemic in Spain, and will help university authorities implement appropriate strategies.

2. Methods

2.1. Participants

The target population was university students in different degrees and years of study at the University of Castilla-La Mancha at its campuses in Albacete and Talavera de la Reina ($n = 606$).

The sampling process was carried out with the collaboration of the academic secretary's office of the Faculty of Health Sciences and the Faculty of Social Sciences at the University of Castilla-La Mancha, as well as the Department of Psychology. Social media and WhatsApp were also used among students, colleagues and friends.

Participants were recruited from e-mail. They received an e-mail from the University secretary's office. This study received ethical approval and was supervised by the Research Commission of the Integrated Management at Talavera de la Reina, Castilla-La Mancha Health Services, Talavera de la Reina, Toledo, Spain (11/2020). Informed consent was obtained electronically before data were collected from the participants (Table 1).

2.2. Instruments

An anonymous online questionnaire was developed for this study. First, we collected background demographic information on gender, age, degree and year of study.

Second, we administered the Fear of COVID-19 Scale (FCV-19S). This new scale was created by Ahorsu et al. (2020) and measures the severity of individuals' fear of COVID-19. It is a seven-item scale and has a stable unidimensional structure with robust psychometric properties. Factor loadings (0.66 to 0.74) and corrected item-total correlation (0.47 to 0.56) of the Fear of COVID-19 Scale were found to be

Table 1.
Socio-demographic data.

Entire Cohort	($n = 606$)
Age (median, SD)	21,59 (3,04) Range (18–40)
Gender (n,%)	
Male	109 (18)
Female	497 (82)
Degrees (n,%)	
Health Sciences	285 (47)
Nursing	71 (11,7)
Podiatry + Nursing	15 (2,5)
Speech and Language Therapy	96 (15,8)
Occupational Therapy	74 (12,2)
Medicine	29 (4,8)
Social Sciencies	143 (23,79)
Working Social	43 (7,19)
Education Social	49 (8,1)
Business Administration and Management	41 (6,8)
Education	10 (1,7)
Others Degrees	178 (29,4)
Course (n,%)	
First	170 (28,1)
Second	140 (23,1)
Third	110 (18,2)
Fourth	186 (30,7)

acceptable. The internal consistency and the test-retest reliability of the scale ($\alpha = 0.82$ and ICC = 0.72) was acceptable. The Fear of COVID-19. The participants are asked to indicate their level of agreement with the statements using a five-item Likert type scale. Answers included "strongly disagree," "disagree," "neither agree nor disagree," "agree," and "strongly agree". The minimum score possible for each question is 1, and the maximum is 5. A total score is calculated by adding up each item score (ranging from 7 to 35). The higher the score, the greater is the fear of COVID-19.

Third, the State-Trait Anxiety Inventory (STAI) questionnaire was used (van Knippenberg, Duivenvoorden, Bonke and Passchiner, 1990). These authors were the first to assess trait anxiety and state anxiety, using a brief 6-item version of the original STAI (Spielberger et al., 1983) obtaining good psychometric properties and a consistent structure ($\alpha = 0.80$ in state anxiety and $\alpha = 0.88$ in trait anxiety). This version comprised six items per scale with a minimum score of 0 and a maximum of 18. The items used were state anxiety items 2, 4, 11, 15, 17 and 18, and trait anxiety items 7, 14, 15, 16, 17 and 18. The answers included 4 alternatives (scored from 0 to 3). This short version has been shown to have good validity in university population (Guillén-Riquelme and Buela-Casal, 2013).

All participants were informed and signed an informed consent.

2.3. Procedure

This research was a descriptive, epidemiological, cross-sectional study. Several steps were taken to translate the Fear of COVID-19 Scale. The translation method used is consistent with that described by theWorld Health Organization for such purpose (World Health Organization, 2020b). First, the Fear of COVID-19 Scale (FCV-19S) by Ahorsu et al. (2020) was translated in Spanish by a bilingual expert (English-Spanish). Later, a bilingual professional (Spanish-English) back-translated (see appendix). Second, an expert panel of 4 members evaluated both translationspak. Third, the FCV-19S scale was piloted on 16 individuals (6 males and 10 females, mean age 19.63) to obtain initial assessment of the scale and to determine the time required and the difficulty involved in responding, with an open question included for participants to suggest any changes that might be necessary. No further changes were in fact made as the pilot participants indicated no changes were needed. Finally, we commenced the study.

Non-probability quota sampling was used (aged 18 or over, enrolled in a university degree course, years 1 to 4). For the sampling process,

we were assisted by the academic secretary's office of the Faculty of Health Sciences and the Faculty of Social Sciences at the University of Castilla-La Mancha, as well as the Department of Psychology. Social media and WhatsApp were also used among students, colleagues and friends.

Data collection began on 22 April 2020 five weeks after the Spanish government decreed the state of alarm[22]. The online questionnaire was openly accessible for 5 days from 22 April 2020 to 26 April 2020 (Google Forms®). On 22 April 2020, the university secretary's office sent an email from the corporate platform to students from all years enrolled in degrees in the previously mentioned faculties, explaining the aim of the research and including a link to respond to the questionnaire. Students, colleagues, and friends were also asked to invite others to respond.

2.4. Data analysis

The analysis of the data was started using the IBM® SPSS® Statistics 22.0 computer program. For the statistical analysis first, it was first checked whether the variables to be statistically analyzed followed a distribution of normality using the K-S test for normality. The sample does not follow a normal distribution of data as indicated by the analysis of the Kolmogorov-Smirnov test of normality in which all the variables evaluated follow a probability less than or equal to 0.05. Therefore, for the analysis of the data, the non-parametric Mann-Whitney test was performed, which is the non-parametric test parallel to the t-test for independent samples. The confidence level of 0.05 was taken into account for all statistical analyzes. In addition, descriptive and frequency distribution (mainly, means and standard deviations) and Chi-square independence tests were used.

Analyses of psychometric properties and statistical analyses were carried out using R version 4.0.0, and the following R packages: GPArotation (Bernaards and Jennrich, 2005), psych (Revelle, 2018), and Rcmdr (Fox and Bouchet-Valat, 2019). In order to account for the ordinal nature of the items, the polychoric correlation matrix was used (Gadermann et al., 2012). Thus, following the Viladrich et al. (2017) recommendations the ordinal omega coefficient (ordinal ω) was used to estimate internal consistency reliability of the scores because the underlying models were congeneric not essentially tau-equivalent.

3. Results

For the total sample, the mean value on the FCV-19S was 16.79 (SD = 6.04), median = 16.0, with a range of 7 to 35. The scale shows good alpha measures of internal consistency or reliability analysis. The findings on reliability allow us to affirm that the FVC-19S scores were adequate in their internal consistency as measured by ordinal alpha (Oα = 0.9); ordinal omega (Oω = 0.94) and Cronbach alpha (α = 0.86).

As regards the process of validation of the FCV-19S, in the exploratory factor analysis, the KMO coefficient showed a value of 0.859, while Bartlett's statistic ($\chi2(21) = 1897.9$, $p < 0.000$) was significant, suggesting that the data matrix is appropriate for conducting an exploratory factor analysis. The parallel analysis (Timmerman and Lorenzo-Seva, 2011) revealed a dimension explaining more variance than expected in random matrices. This factor overall explained 49.1% of the total variance for the 7 items on the instrument. Table 2 shows the psychometric properties and those of the items.

Criterion validity was supported by the FCV-19S and STAI as indicated by the significant correlations (both $p < 0.000$). There were significant positive correlations between fear of COVID-19 and (i) state anxiety ($r = 0.496$, $p < 0.000$) and (ii) trait anxiety ($r = 0.257$, $p < 0.000$). Howerer, scores were low in trait anxiety.

Significant differences were obtained in some variables. After recoding certain variables, it was found that students enrolled in Health Sciences degrees (composed of five degrees) scored higher on the Fear

of COVID-19 Scale (FCV-19 S) compared to students on other degree courses (Z:-2290; $p \leq 0.002$) with higher mean ranges (243.4 versus 214.01). Similarly, students enrolled in Social Sciences degrees (composed of four degrees) scored higher than students on other degree courses (Z:-3720; $p \leq 0.000$), with a score of 182.46 compared to 143.76. Age was also significantly related to the FCV-19S (Z:-2436; $p \leq 0.015$), with first-year students presenting a higher mean range (331.20) compared to second-, third- and fourth-year students (292.70).

4. Discusion

The present work aimed to determine the level of fear of COVID-19 in a Spanish university population and assess the psychometric properties of the COVID-19 Fear Scale (FCV-19S) proposed by Ahorsu et al. (2020).

Barbisch et al. (2015) describe how the confinement and mass quarantine caused a sense of collective hysteria, fear and raise anxiety. However, the scores obtained by our university students on the FCV-19S suggest the presence of fear, although the scores are not particularly high. In contrast to Ahorsu, et al. (2020) and Sakib et al. (2020), who reported high scores, our data show fear of COVID-19 can be considered medium-level or moderate, with this being similar to the findings of Reznik et al. (2020) in Eastern Europe. Fear is an emotional response found by other authors (Ahorsu, et al., 2020; Barbisch et al., 2015; Lin, 2020; Pan, Chang & Yu, 2005; Pellecchia et al., 2015; Reynolds et al., 2008; Rubin and Wessely, 2020; Shigemura et al., 2020), and hence our results are striking.

Arguably, as the measures of isolation, confinement and quarantine implemented by the Spanish government as part of the declaration of a state of alarm have been effective in reducing the number of contacts, new infections and deaths among the population (Centers for Disease Control and Prevention, 2017; Brooks et al., 2020), with low mortality and morbidity rates on COVID-19 in Spain (Ministerio de Sanidad, Consmo y Bienestar Social, 2020) and consequently fear of COVID-19 has been mitigated. Being confined in the family home where individuals may feel a greater sense of safety and protection might decrease the level of fear though a feeling of reduced vulnerability, reduced exposure and a sense of personal/situational control, where their family homes play an important role as a measure of social support (Bao et al., 2020).

In addition, the length of time passed from the implementation of confinement in Spain and the subsequent gradual fall both in the number of new infections and deaths until the data for this study were collected on 22 April 2020, five weeks after the Spanish government declared the state of alarm, may have had an impact on the results, given the decrease in the contagion effect and, consequently, a reduction in fear of infection. The results from surveys using the scale in Iran (Ahorsu et al., 2020) and from Russia and Belarus (Reznik et al., 2020), Italy (Soraci et al., 2020) and Turkey (Satici et al., 2020) were collected at different times and in places where government responses to COVID-19 vary along with the nature of public information available about the infectious disease.

Furthermore, our participants were all young university students and this population might have other psychological mechanisms, such as illusion of control or decreased risk perception, among others. Research on other outbreaks of infectious disease suggests that psychological individual difference variables, such as intolerance of uncertainty, perceived vulnerability to disease, anxiety (worry) and specific personality traits or risk groups (based on gender, age, education, ethnicity and/or religiosity) proneness may play a role in fear (Asmundson and Taylor, 2020; Lin, 2020; Taylor, 2019; Pakpour and Griffiths, 2020). In addition, the participants were generally young, and perhaps have fewer responsibilities than adults who are employed full-time (Wang et al., 2020).

It might also be that some type of intrapersonal response, strategy or

Table 2.
Item and psychometric properties of the FCV-19S.

Item	Factorloading*	Item-totalcorrelation	Mean (SD)	Skewness	Kurtosis
1. I am most afraid of coronavirus-19	.728	.75	2.91 (1.12)	-0.058	-0.946
2. It makes me uncomfortable to think about coronavirus-19	.701	.74	2.98 (1.23)	- 1.86	-1.126
3. My hands become clammy when I think about coronavirus-19	.606	.67	1.74 (0.96)	1.283	1.118
4. I am afraid of losing my life because of coronavirus-19	.669	.71	2.42 (1.29)	.503	-0.974
5. When watching news and stories about coronavirus-19 on social media, I become nervous or anxious.	.700	.73	2.96 (1.30)	-1.02	-1.235
6. I cannot sleep because I'm worrying about getting coronavirus-19.	.721	.79	1.81 (1.01)	1.155	.493
7. My heart races or palpitates when I think about getting coronavirus-19.	.769	.83	1.98 (1.11)	.841	-0.450

* Extraction method: Factor loadings using the extraction method: unweighted least squares.

regulation is triggered. Future work should address these questions to determine whether there exists a psychological and/or personality profile related to lower presence of fear of COVID-19. Therefore, caution should be exercised regarding comparisons and conclusions about fear of COVID-19 and its impact in different samples.

Regardless of these results, it behooves us to be more alert than ever and we must not lower our guard given that participants with such moderate scores on the FCV-19S might be likely to relax confinement measures, with a subsequent risk to the health of others, because fear plays an important role in motivating people to comply with COVID-19-related recommended health behaviors (Harper et al., 2020).

The relationships between the variables reveal some interesting findings. For example, fear of COVID-19, as measured on the FCV-19S, showed significant associations with the year the students were enrolled in. First-year students showed greater fear than those enrolled in subsequent years of study (2nd, 3rd and 4th). Fear would thus appear to be related to age, with younger students being more afraid of the disease. In Russian population, Rezik et al. (2020) found that university students scored higher on the FCV-19S compared to students who had completed their degree and were thus older. However, our findings are different to those of the FCV-19S studies conducted in Iran by Ahorsu et al. (2020), in Italy by Soraci et al. (2020) and in Bangladesh by Sakib et al. (2020), where age was found to be non-significant, and individuals of all ages felt threatened and answered questions in a similar way. Consequently, it seems that the FCV-19S allows us to discriminate fear of COVID-19 according to the age of the students. Future research could delve deeper into such findings in order to bolster age-related strategies, personalizing health information by age range, promoting social responsibility in younger students during the pandemic, etc., given that this is a public health issue that affects everyone in society.

We also found a significant relationship for the degree course studied. Students from the Faculties of both Health Sciences and Social Sciences scored higher on fear of COVID-19 on the FCV-19S than students of other degrees. The degree course studied at the Health Sciences Faculty are Speech and Language Therapy, Occupational Therapy, Medicine, Podiatry, Nursing and the double degree in Podiatry and Nursing. Some of these studies, especially Nursing and Medicine, are disciplines related to care, empathy, illness and health, and are currently on the front line against the spread of COVID-19; arguably fear might thus be greater among students of these degrees compared to students in other fields. As regards the Faculty of Social Sciences, their students are enrolled on courses in Education, Social Work, Social Education and Business Administration and Management, and although there seems to be no evident explanation for their higher levels of fear, it may be that the more social and empathetic profile of their degrees might be at the root of their higher scores. Other works have suggested the importance of empathy skills as a differentiating factor (Andersen et al., 2020). However, in our case, we are unaware of what other degrees form part of this category of response, potentially being more technical degrees or ones related to other professional profiles, which might imply students have a different perspective on the

pandemic situation, where empathy, bonding relationships and fear are less important.

Another aim of this study is related to the psychometric properties of the FCV-19S. Broadly speaking, our findings allow us to conclude that the FCV-19S presents sufficient empirical evidence of reliability and validity to support its use in the context presented in this work. Our analysis of the theoretical structure of the FCV-19S confirmed the unidimensionality of the 7-item scale in a Spanish undergraduate sample where the construct was found to be stable with a one-factor structure explaining 49.1% of the variance. We can conclude that the Spanish version of the Fear of COVID-19 Scale supported the structure of the original scale by Ahorsu et al. (2020) and in other samples and languages (Alyami et al., 2020; Ornell et al., 2020; Reznik et al., 2020; Sakib et al., 2020; Satici et al., 2020; Soraci et al., 2020).

The concurrent validity of the FCV-19S significantly correlated with state anxiety and trait anxiety which suggests that individuals with severe fear of COVID-19 may have these comorbid disorders. Thus, fear increases anxiety and stress levels in healthy individuals and intensifies the symptoms of those with pre-existing psychiatric disorders (Ornell et al., 2020; Shigemura et al., 2020). Similar results have been found in others studies validating of the Fear of COVID-19 Scale (Ahorsu et al., 2020; Reznik et al., 2020; Sakib et al., 2020; Satici et al., 2020; Soraci et al., 2020).

The findings of the present study should be viewed in light of some limitations. First, the sample was a convenience sample of undergraduates and was not necessarily representative of the general population of Spain. Future studies using nationally representative samples and students from different degrees are needed to confirm the results reported here. Second, this study did not examine the stability of the FCV-19S over time. Future research should therefore incorporate test-retest reliability measures although the results of the present study showed that the Spanish´undergraduates version of the FCV-19S has robust psychometric properties should need to assesment in other temporal moments during the pandemic or after this. Third, the participant pool had a majority of female participants and, therefore, tests for gender differences were not possible. Finally, it would be interesting to assess the subjective emotions and perception of fear in an objective way, as participants' responses may be affected by social desirability.

In conclusion, this study demonstrated that the Fear of COVID-19 Scale is a seven-item unidimensional scale with robust psychometric properties. Moreover, total scores on the FCV-19S are comparable across different ages and different degrees, which suggests that it is a good psychometric instrument to be used in assessing and allaying fears of COVID-19 among undergraduates, despite our scores having been so low. Future research is needed, across locations and over time, to learn more about the utility of the FCV-19S in order to develop prevention or intervention programs to emphasize the importance of determining the risk groups based on socio-demographic variables (Asmundson and Taylor, 2020; Pakpour and Griffiths, 2020). We are facing an important challenge where the University will have to take a lead in the process through academic curricula.

Authors statement

The paper is the result of my team and I. This paper does not contain any published or written content by others, except as expressly indicated and quoted in the paper.

All procedures performed in this study involving human participants were in accordance with the ethical standards of the University's Research Ethics Board and with the 1975 Helsinki Declaration. Informed consent was obtained from all participants.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Appendix. Fear of COVID-19 Scale

By completing the questionnaire below you will aid us in assessing fear of the ongoing COVID-19 pandemic. Please indicate on a scale from 1 to 5 your level of agreement with the following statements, being:

1 Strongly disagree
2 Disagree
3 Neither agree nor disagree
4 Agree
5 Strongly agree

1	I am most afraid of coronavirus-19.	1	2	3	4	5
2	It makes me uncomfortable to think about coronavirus-19.	1	2	3	4	5
3	My hands become clammy when I think about coronavirus-19.	1	2	3	4	5
4	I am afraid of losing my life because of coronavirus-19.	1	2	3	4	5
5	When watching news and stories about coronavirus-19 on social media, I become nervous or anxious.	1	2	3	4	5
6	I cannot sleep because I'm worrying about getting coronavirus-19.	1	2	3	4	5
7	My heart races or palpitates when I think about getting coronavirus-19.	1	2	3	4	5

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