



Fear During COVID-19 pandemic: Fear of COVID-19 Scale Measurement Properties

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Dear Editor,

The emergence and development of the COVID-19 pandemic is having a toll on the mental health of the general population, and healthcare workers around the world, often manifested in depression, fear, stress, trauma, and anxiety (Ahorsu et al. 2020; Mamun and Ullah 2020; Lee et al. 2020). Various scales have been developed during the pandemic to measure these effects (Ransing et al. 2020). Fear during the COVID-19 pandemic has been associated with serious mental health consequences, such as passive suicidal ideation, alcohol and substance use, and extreme hopelessness (Mamun and Ullah 2020). Hence, a timely and accurate assessment of COVID-19-related fear is relevant for clinicians.

The Fear of COVID-19 Scale (FCV-19S) is a 7-item scale that assesses the severity of COVID-19-related fear (Ahorsu et al. 2020). Each item is rated on a 5-point Likert scale: 1 (strongly disagree) to 5 (strongly agree), with higher scores indicating a greater fear of COVID-19 (Ahorsu et al. 2020). The tool was developed in Persian language, and its initial validation was conducted in a sample of Iranian adults drawn from the general population. Following the initial validation, several studies have examined the psychometric properties of the scale across different populations and in different languages (Ransing et al. 2020). In this letter, we provide an overview of the available literature on the utility and psychometric properties of the FCV-19S.

We searched PubMed using the keywords “COVID-19” or “SARS-CoV-2” or “Coronavirus disease” and “Fear Scale” or “FCV-19S” or “Fear of COVID-19 Scale” till 30 August 2020. We found 19 studies assessing the reliability and/or validity of the FCV-19S. The full texts for each article were retrieved and data extracted regarding sample size, mean age, language, country, and scale reliability and validity. A summary of the included studies is presented in Table 1.

The FCV-19S has been translated into 14 languages and validated across 20 different countries (Pakpour et al. 2020). Three studies, including the initial validation study, were conducted in the Middle East, six in Asia, six in Europe, and one each in the USA, New Zealand, Cuba, and Peru. Most of the studies ($n = 18$) validated the FCV-19S with adult populations, with one study being conducted among adolescents. The Cronbach’s alpha values across the different studies ranged from 0.81 to 0.93 indicating high reliability of the FCV-19S.

Twelve studies investigated the criterion validity (either discriminant or convergent) of the FCV-19S. Similarly to the original validation (Ahorsu et al. 2020), Soraci et al. and Alyami et al. examined the validity of the FCV-19S against the HADS among Italian and Saudi Arabian adults,

Table 1 Validity and reliability of the FCV-19S

Source	Sample size/population/gender	Mean age	Language	Country	Internal consistency?	Validity
Ahorsu et al. 2020	717 (adults of 18 years and above) Male: 58% Female: 42%	31.25 ± 12.68	Persian	Iran	0.82	Concurrent validity evaluated using HADS: - Depression ($r = 0.42$) - Anxiety ($r = 0.51$) Concurrent validity evaluated using PVDS: - Perceived infectability ($r = 0.483$) - Germ aversion ($r = 0.459$) Factor analysis: Unidimensional factor structure Construct validity evaluated using: - HADS ($r = 0.64$) - SMSP-A ($r = 0.70$) Confirmatory factor analyses: - One-factor model fit the data Concurrent validity evaluated using Bangla PHQ-9 ($r = 0.41$) Confirmatory factor analyses: - One-factor model fit the data
Soraci et al. 2020	249 (adults of 18–76 years) Male: 8% Female: 92%	34.50 ± 12.21	Italian	Italy	0.87	
Sakib et al. 2020	8550 (10 years and older) Male: 56.0% Female: 44.0%	26.5 ± 9.1	Bangla	Bangladesh	0.87	
Satici et al. 2020	1304 (adults 18–64 years) Male: 29.7% Female: 70.3%	29.47 ± 10.54	Turkish	Turkey	0.85	Concurrent validity evaluated using DASS-21: - Depression ($r = 0.38$) - Anxiety ($r = 0.55$) - Stress ($r = 0.47$) Concurrent validity evaluated using SWLS: - Life satisfaction ($r = -0.20$) Confirmatory factor analyses: - One factor model fit the data Principal component analysis revealed a two-factor model. One factor seems to reflect physiological responses to COVID-19 while a second one seems to represent emotional responses to COVID-19
Reznik et al. 2020	850 Male: 26.8% Female: 73.2%	34.8 ± 13.0	Russian	Eastern Europe (Russia and Belarus)	0.81	Principal component analysis revealed a two-factor model. One factor seems to reflect physiological responses to COVID-19 while a second one seems to represent emotional responses to COVID-19
Nguyen et al. 2020	5423 university students Male: 47.9% Female:	22.0 ± 2.0	Vietnamese	Vietnam	0.90	Convergent validity evaluated using GAD: Anxiety ($r = 0.63$) Principal component analysis revealed a one-factor model

Table 1 (continued)

Source	Sample size/population/gender	Mean age	Language	Country	Internal consistency?	Validity
Martínez-Lorca et al. 2020	52.1 606 university students Male: 18% Female: 82%	21.59 ± 3.04	Spanish	Spain	0.86	Criterion validity evaluated using the STAI: - State anxiety (r = 0.496) - Trait anxiety (r = 0.257) Exploratory factor analysis revealed unidimensionality of the scale Convergent validity evaluated using DASS: - Anxiety subscale (r = 0.43) - Stress (r = 0.33) - Depression (r = 0.24) Exploratory factor analysis: One-factor model While forcing on 2 factors, principal component analysis revealed a two-factor model. One factor corresponded to the emotional fear reaction, while a second one corresponded to symptomatic expressions of fear Concurrent validity evaluated using HADS: - Depression (r = 0.56) - Anxiety (r = 0.66) - Total HADS (r = 0.66) Confirmatory factor analyses: - One-factor state-trait model fit the data Construct validity evaluated using GAD-7 - Total GAD scores (r = 0.68) Exploratory factor analysis: Revealed a one-factor solution
Tzur Bitan et al. 2020	639 Male: 15.2% Female: 84.5% Other: 0.3%	Below 30 to above 51 Not reported	Hebrew	Israel	0.86	
Alyami et al. 2020	693 (adults 18 years and above) Male: 57.9% Female: 42.1%	34.75 ± 11.80	Arabic	Saudi Arabia	0.88	
Perz et al. 2020	237 (undergraduate and graduate students) Male: 27% Female: 73%	30.3 ± 10.2	English	USA	0.91	
Pang et al. 2020	228 Male: 28.9% Female: 71.1%	26	Malay	Malaysia	0.89	Convergent validity evaluated using DASS-21: - Depression (r = 0.344) - Anxiety (r = 0.481, p < 0.001) - Stress (r = 0.389, p < 0.001) Confirmatory factor analysis: One-factor model

Table 1 (continued)

Source	Sample size/population/gender	Mean age	Language	Country	Internal consistency?	Validity
Broche-Pérez et al. 2020a, Broche-Pérez et al. 2020b	772 Male: 26.3% Female: 73.7%	36 ± 14.61	Spanish	Cuba	0.80	Not reported
Masuyama et al. 2020	629 adolescents Male: 50.9% Female: 49.1%	12.96 ± 0.83	Japanese	Japan	0.82	Construct validity evaluated using the: - PVDS ($r = 0.17$) - PHQ-A ($r = 0.08$) - GAD-7 ($r = 0.18$) Factor analysis: - Two-factor model Convergent validity evaluated using the: IES-R: ($r > 0.5$) GAD-7: not indicated Confirmatory factor analysis: - Two-factor model
Huarcaya-Victoria et al. 2020	832 (adults 18–80 years) Male: 34.4% Female: 65.6%	38.37 ± 12.75	Spanish	Peru	0.87	Concurrent validity evaluated using PVDS: - Perceived infectability (sample 1: $r = 0.35$; sample 2: $r = 0.45$) - Germ aversion (sample 1: $r = 0.39$; sample 2: $r = 0.45$) Discriminant validity evaluated using WEMWBS ($r = -0.3$) Principal component analysis confirmed unidimensionality of the tool
Winter et al. 2020	Sample 1 = 1397, (adults aged between 18 and 88 years) Male: 60.3% Female: 39.7% Sample 2 = 1023 (adults aged between 18 and 85 years) Male: 30.3% Female: 69.7%	Sample 1 (47.5 ± 16.3) and Sample 2 (42.0 ± 13.3)	English	New Zealand	Sample 1 ($\alpha = 0.89$) and Sample 2 ($\alpha = 0.88$)	Concurrent validity evaluated using PVDS: - Perceived infectability (sample 1: $r = 0.35$; sample 2: $r = 0.40$) - Germ aversion (sample 1: $r = 0.39$; sample 2: $r = 0.45$) Discriminant validity evaluated using WEMWBS ($r = -0.3$) Principal component analysis confirmed unidimensionality of the tool
Tsipropoulou et al. 2020	2970 (18 years and above) Male: 24.5% Female: 72.5% 400 Male: 55.5% Female:	Not reported	Greek	Greece	$\alpha = 0.87$	Concurrent validity evaluated using: - GAD-7 ($r = 0.71$) - PHQ-9 ($r = 0.47$) Confirmatory factor analysis: One-factor model Confirmatory factor analysis: One-factor model
Chang et al. 2020	400 Male: 55.5% Female:	46.91 ± 10.92	Chinese	Taiwan	$\alpha = 0.93$	Concurrent validity evaluated using: - GAD-7 ($r = 0.71$) - PHQ-9 ($r = 0.47$) Confirmatory factor analysis: One-factor model Confirmatory factor analysis: One-factor model

Table 1 (continued)

Source	Sample size/population/gender	Mean age	Language	Country	Internal consistency?	Validity
Haktanir et al. 2020	44.5% 668 Male: 28% Female: 72%	31.04 ± 10.70	Turkish	Turkey	$\alpha = 0.86$	Discriminant validity evaluated using BRS: - Resilience ($r = -0.32$) Confirmatory factor analysis: One-factor model Concurrent validity evaluated using PROMIS: - Depression ($r = 0.49$) - PROMIS anxiety ($r = 0.69$)
Harper et al. 2020	344 Male: 50% Female: 50%	34.5 ± 12.0	English	UK	$\alpha = 0.88$	Discriminant validity evaluated using WHOQOL-BREF - Psychological ($r = -0.08$)

r Pearson's coefficient, *HADS* Hospital Anxiety and Depression Scale, *SMSP-A* Severity Measure for Specific Phobia—Adult, *PHQ-9* Patient Health Questionnaire-9, *STAI* State Trait Anxiety Inventory, *DASS* Depression, Anxiety and Stress Scale, *PHQ-A* Patient Health Questionnaire for Adolescents, *PVDS* Perceived Vulnerability to Disease Scale, *PCL-C* the Abbreviated PTSD Checklist, *GAD-7* Generalized Anxiety Disorder Scale, *CD-RISC-10* 10-Item Connor-Davidson Resilience Scale, *SCS-SF* Self-Compassion Scale - Short Form, *WEMWBS* Warwick-Edinburgh Mental Wellbeing Scale, *BRS* Brief Resilience Scale, *PROMIS* Patient-Reported Outcomes Measurement Information System, *IES-R* Impact of Event Scale-Revised, *WHOQOL-BREF* World Health Organization Quality-of-Life Scale

respectively (Soraci et al. 2020; Alyami et al. 2020). They both found the FCV-19S to be valid with acceptable correlation values of 0.64 and 0.66, respectively. Also, Winter et al. (2020) confirmed the validity of the FCV-19S in two samples of New Zealand adults using the PVDS (Winter et al. 2020). Other studies that examined and confirmed the convergent validity of the FCV-19S among adults used various anxiety and depression measures (Sakib et al. 2020; Satici et al. 2020; Pang et al. 2020; Martínez-Lorca et al. 2020). Further support for the criterion validity of the FCV-19S among adults came from findings indicating acceptable correlation coefficient values for discriminant validity (-0.32 to -0.08).

Among younger populations, findings are inconsistent. Martínez-Lorca et al. compared FCV-19S scores with those of the STAI among Spanish undergraduate students (Martínez-Lorca et al. 2020). The authors found a positive correlation with state anxiety ($r = 0.496$), but not with trait anxiety ($r = 0.257$). Similarly, Perz et al. validated the FCV-S19 using the GAD-7 in university students in the USA and found positive correlations between the FCV-19S and the GAD-7 ($r = 0.68$) (Perz et al. 2020). In the only study conducted in an adolescent population, Masuyama et al. examined the construct validity of the FCV and reported poor correlation coefficient values of FCV-19S against the PVDS ($r=0.17$), the PHQ-9 modified for Adolescents (PHQ-A) ($r=0.08$), and GAD-7 ($r=0.18$) (Masuyama et al. 2020).

Three studies conducted in Japan (Masuyama et al. 2020), Peru (Huarcaya-Victoria et al. 2020), and Russia and Belarus (Reznik et al. 2020) examined the factor structure of the FCV-19S. All three studies reported the factor structure of the FCV-19S to be consistent with a two-factor model. Furthermore, the loadings on the factor were significant and strong (from 0.684 to 0.897) (Soraci et al. 2020). The results showed that seven items of the FCV-19S strongly loaded on one component and explained 62.15% of the variance (Nguyen et al. 2020). Finally, the findings of factor analysis varied across populations. While a majority of the studies confirmed the unidimensionality of the scale as reported in the initial validation study, some authors reported their respective data to be consistent with a two-factor solution (Huarcaya-Victoria et al. 2020; Masuyama et al. 2020; Reznik et al. 2020). However, one study on exploratory factor analysis confirms one factor model but forcing on two factors (Tzur Bitan et al. 2020).

Overall, the findings of this review confirm the reliability, criterion, and construct validity of the FCV-19S for adults across multiple populations around the world. However, findings in younger populations are inconsistent. Future research ought to examine the usefulness of this FCV-19S in the real context in terms of cost-effectiveness, efficiency, and correlation with actual psychiatric disorders.

Declarations

Conflict of interest The authors declare that they do not have conflict of interest.

Ethical Statement Not applicable.

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