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Review article

A systematic review of questionnaires assessing the psychological impact of COVID-19

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ABSTRACT

The COVID-19 pandemic has led to a number of complications in everyday life, greatly affecting public health. Estimating its impact on mental health constitutes a priority issue. The current study aims to summarize the scales that have been specifically developed for this reason and are not adaptations of already existing scales. A comprehensive search was conducted by two reviewers during the period 28/09/2020–30/09–2020 in the following databases: PubMed, ScienceDirect, ScieLo, Mendeley, Google Scholar. A quality appraisal of the identified scales was made by three reviewers using the COSMIN checklist for methodological issues and the Terwee criteria for measurement properties. Our search strategy yielded a total of 855 results. Of these, 832 articles were excluded according to exclusion criteria, 23 were assessed for eligibility and 10 were finally included. These are presented in the text with additional useful information found separately. The identified scales tended to be quite short and examine stress, anxiety or fear. All studies were cross-sectional and the majority was conducted online. Most of them had a good Cronbach value (> 0.80) and adequate fit indices. It is however noted that the evaluation of their quality may be untimely due to relevant lack of data.

1. Introduction

Living with the COVID-19 pandemic constitutes an unprecedented crisis for people around the globe, with considerable impact on public mental health. Health problems such as stress, anxiety, depressive symptomatology and insomnia have intensified in the general population (Torales et al., 2020; Voitsidis et al., 2020). Studies in special populations also suggest elevated risk for negative emotional responses. Pregnant women seem to be more prone to anxiety and depression during the pandemic (López-Morales et al., 2021). The strict protective measures are notably burdensome for elderly people, leading to heightened feelings of loneliness (Parlapani et al., 2020).

Worldwide, healthcare systems have been -more or less- unprepared to face such an extreme situation, leading to adverse consequences. To begin with the frontline, general practitioners (GPs) have shown elevated symptoms of depression and anxiety, as well as lower quality-of-life measures. Those have been related to a sense of helplessness and inadequate personal protective measures, highlighting the need for substantial support and reinforcement of primary health care (Amerio et al., 2020). It has even been noted that healthcare professionals, who

have been standing in the first line of defense since the beginning of the battle towards the pandemic, have shown signs of distress, such as posttraumatic stress symptoms (Blekas et al., 2020).

«If you know the enemy and know yourself, you need not fear the result of a hundred battles» (Tzu S., ca. 5 century B.C.E./2002). This famous quote, derived from the ancient strategy text “The art of war” shows the way to the most appropriate response to this crisis. Not only should we learn more about the virus itself, but we have to understand more about its impact on our wellbeing. Estimating the dimensions of its consequences on our mental health is a necessary step towards this direction. Novel situations stipulate the creation of appropriate and specialized measuring tools. Psychometric scales constitute one of the most widely used research method in mental health sciences providing reliable and valid measures. When short and easy-to-administer, they can accelerate research, especially under unpropitious circumstances. In fact, when long scales are not available short measures may represent psychometrically sound alternatives for assessing psychological domains (Gogol et al., 2014). As a result, since the emergence of the pandemic, a considerable number of new psychometric scales has been developed and used by the researchers specifically for screening,

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diagnostic or follow-up reasons associated with COVID-19.

Cortez et al. (2020) highlighted the importance of having tailored COVID-19 tools: scale scores can be compared across various countries; specific tools could contribute to policy making processes; scales will help explore the effectiveness of interventions in before-after studies. A scoping review conducted in early August 2020, summarized the -available at the time- tools and suggested that the 15 identified scales were heavily biased towards the somatic symptoms of COVID-19-imposed mental health problems (Chandu et al., 2020).

The aim of the current study was to identify, summarize and present the aforementioned questionnaires, as well as their validation studies, and to evaluate their methodological quality by the CONsensus-based Standards for the selection of health Measurement Instruments (COSMIN) evaluation system, in an effort to facilitate the research conducted under these special circumstances (Mokkink et al., 2010; Terwee et al., 2012).

2. Methods

2.1. Design and search strategy

Since the majority of relevant studies can be identified within a minimal number of databases (Hartling et al., 2016), a comprehensive search in a total of five open-access databases (PubMed, ScienceDirect, ScieLo, Mendeley and Google Scholar) was conducted from September 28 to September 30, 2020.

Although more databases are available online and would possibly return more results, we chose to focus on those that were available without a subscription. This allowed for a more prompt and timely completion of the research, while it also facilitates most readers by focusing on data that is more widely accessed.

The search string used was: "COVID-19 AND (scale OR questionnaire OR measure) AND development", adapted appropriately for the title or abstract of the article, for each database where this was available. After the final identification of the scales, we looked for further related publications providing useful information on the scales' psychometric properties. gray literature was searched using Google Scholar. Ethical approval was obtained by the Scientific Board of the General Hospital that is the workplace of the authors (563/2020, blinded for review), which confirmed that the current review utilized secondary data that was available for public use. All the procedures of conducting a systematic review have been followed and all the studies and authors have been credited.

2.2. Inclusion criteria

The inclusion criteria were set as follows: original research (full length articles/brief reports) written in English; published in 2020; instruments developed specifically for COVID-19; instruments assessing psychological properties; psychometric properties available; full text available; published in a peer-reviewed journal.

2.3. Exclusion criteria

Commentaries, letters to the editor, editorials and study protocols were excluded from the review. Scales that were not originally developed but originated as adaptations of already existing scales were excluded from the study.

2.4. Data extraction

The selection of abstracts and full-text articles was performed by two reviewers (VAN, MDK) independently. All identified abstracts were downloaded, checked and duplicates removed. Abstracts were scored on a two-point scale to determine if: the study involved a newly developed COVID-19 related questionnaire; the study reported on psychometric

data of the questionnaire. Full articles that met the inclusion criteria were retrieved and captured for the following parameters: study purpose, study population, study period, sampling method, construct being measured, participants' mean age, gender distribution, language, number of items and subscales, response option types, reliability, validity. References were also reviewed to check for additional relevant publications that may have escaped the electronic database search.

2.5. Quality appraisal

The psychometric properties were identified and rated according to established criteria. The COSMIN checklist was used to evaluate the methodological quality of the studies presented in respect with the following domains: content validity, structural validity, internal consistency, and reliability. Responsiveness was outside the scope of this review as "gold standard" measures were not available when the studies were conducted. Cross-cultural validity was also outside the scope of the current review as only newly developed questionnaires were included.

The assessment of the psychometric quality was based on the Terwee criteria; measurement properties have been considered in respect with the following domains: structural validity, internal consistency, reliability, measurement error, hypothesis testing for construct validity. Psychometric properties were rated as positive (+), intermediate (?), negative (-), or no information available (0).

All ratings were delivered by three reviewers (PV, VH, EP) independently. Reviewers discussed a priori how the quality criteria will be rated and a fourth reviewer (ID) compared the ratings. The final consensus was reached with the input of all four reviewers.

3. Results

The original search yielded a total of 855 results. After screening the articles in order to control for inclusion and exclusion criteria, a total of 10 scales were identified. The flowchart of the search strategy is presented in Fig. 1.

3.1. Descriptive data of the included studies

For each one of the identified scales, a separate search was then made, aiming to find additional useful information, according to the purpose of this review. The results are presented below according to the date that the research was conducted and wherever this information was unavailable, according to the date of reception of the article by the journal. This form is used as an attempt to indicate the evolution of the creation of the new scales alongside the progression of the pandemic. Table 1 summarizes the characteristics of the 10 included studies validating questionnaires on aspects related to the COVID-19 psychosocial impact.

3.1.1. Fear of COVID-19 scale (FCV-19S)

This 7-item 5-point-Likert scale was developed soon after the emergence of the COVID-19 pandemic, aiming to detect fear of COVID-19 and its severity in the general population (Ahorsu et al., 2020). It showed good psychometric properties, with an internal consistency of $\alpha = 0.82$ and a composite reliability of 0.88. It has a unidimensional construct and in the original study it correlated positively with depression, anxiety, germ aversion and perceived susceptibility to infection. Consequently, it has also been correlated with other parameters, such as specific phobia (Soraci et al., 2020), psychological distress and life satisfaction (Satici et al., 2020). Although a cutoff was not originally suggested, later studies attempted to identify a clinically significant score that predicts greater risk for comorbid psychopathology (Nikopoulou et al., 2020). The scale has been translated and validated in many languages.

3.1.2. Coronavirus anxiety scale (CAS)

This is a short, unidimensional 5-item scale that measures the level of

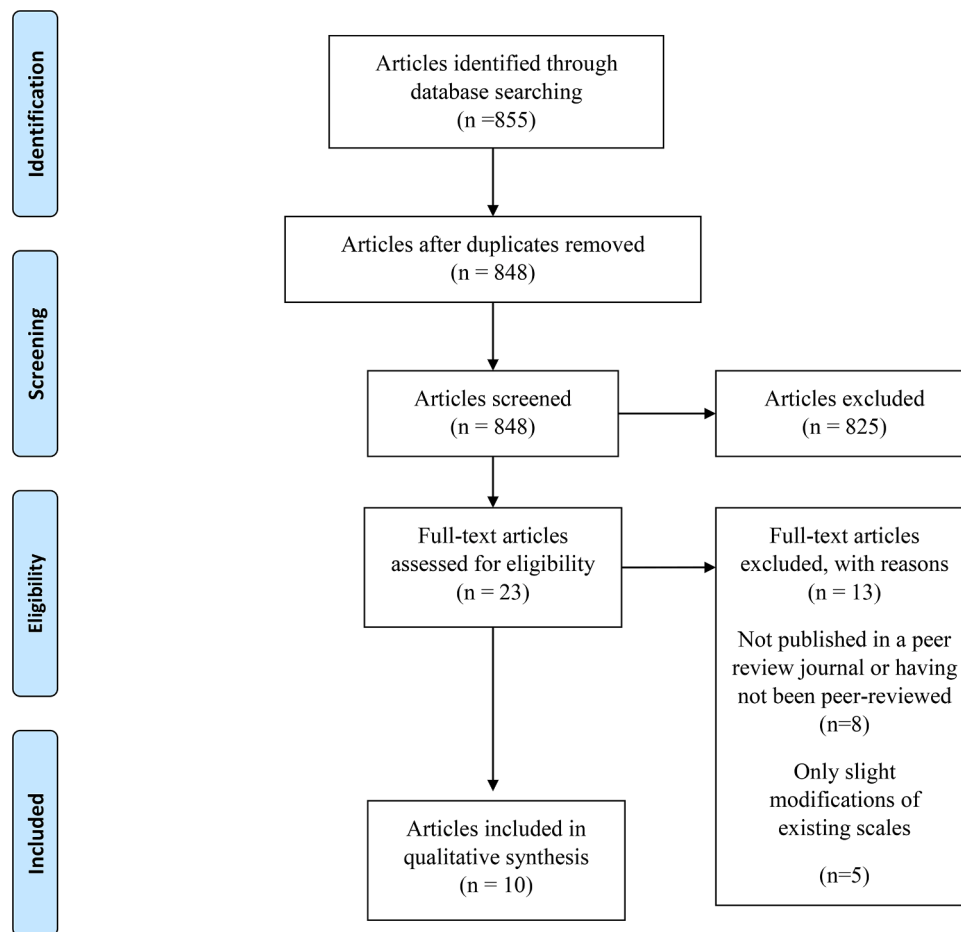


Fig. 1. PRISMA flow diagram of article selection progress.

dysfunctional anxiety related to COVID-19 (Lee, 2020). The subject indicates the frequency of certain physiological symptoms related to fear and anxiety (dizziness, sleep disturbances, tonic immobility, appetite loss, abdominal stress) over the last 2 weeks, on a 5-point Likert scale. Scores ≥ 9 suggest significant anxiety with 90% sensitivity and 85% specificity. The instrument shows a high internal consistency ($\alpha = 0.93$). It has been shown to predict depression, anxiety and death anxiety. The scale has been translated and validated in many languages.

3.1.3. COVID-19 – impact on quality of life (COVID-QoL)

The COVID-QoL is a brief, unidimensional instrument that contains 6 questions on a 5-point Likert scale (Repišti et al., 2020). It examines the impact of COVID-19 on the quality of life regarding mental health. It was developed on a sample from four Balkan countries and the authors underline that it was the first study to report findings from both general and clinical population. Questions explore the sense of impact on one's quality of life, mental and physical health decline, anxiety, depression and personal safety. Cronbach's alpha was greater than 0.85 for both samples.

3.1.4. COVID stress scales (CSS)

This scale consists of 36 items that measure the level of distress related to COVID-19 and it presents a 5-factor structure with 5 sub-scales that specifically assess: Danger and contamination fears; fears regarding economic consequences; xenophobia; compulsive checking and reassurance seeking; traumatic stress symptoms related to COVID-19 (Taylor et al., 2020a). The authors subsequently proposed a multidimensional COVID-19 stress model based on the aforementioned and additional parameters, such as avoidance behaviors and panic

buying, with risk of COVID-19 in its core (Taylor et al., 2020b). Each sub-scale had a Cronbach alpha coefficient > 0.80 , presenting good-to-excellent reliability.

3.1.5. COVID-19 phobia scale (C19P-S)

Fear of coronavirus can be examined as a special phobia, in accordance with the relevant DSM-5 criteria. This instrument was developed aiming to assess "corona phobia", as it was named by its creators (Arpaci et al., 2020). It contains 20 items rated on a 5-point Likert scale that examine psychological, psycho-somatic, economic and social factors. It scores in a range from 20 to 100 and higher scores indicate greater severity, while it possesses good psychometric properties ($\alpha = 0.92$, internal reliabilities from 0.85 to 0.90).

3.1.6. Panic buying scale (PBS)

This short, 7-item, 7-point Likert scale was the first to examine panic buying behavior as a result of the COVID-19 pandemic (Lins and Aquino, 2020). It was validated in the Brazilian population, showing excellent psychometric properties ($\alpha = 0.90$). Positive correlations were found mainly with impulse buying but also with past and future temporal focus and risk perception, while negative ones were found with optimism and age.

3.1.7. COVID-19 related psychological distress (CORPD)

CORPD was developed in China aiming to examine distress levels in healthy populations (Feng et al., 2020). It consists of 14 items with the answers given on a 5-point Likert scale. Two dimensions are explored, namely Anxiety and Fear, and Suspicion, with a good internal consistency ($\alpha = 0.88$). The authors highlight that suspicion about a possible

Table. 1
Demographic characteristics of studies included in the review.

Scale	Authors	Sampling	Online platform	Time period	Age			Gender		Population	Language
					M	SD	Range	Male (%)	Female (%)		
Fear of COVID-19 Scale S(FCV-19S)	Ahorsu et al., 2020	Convenience	-	-	31.25	12.68	-	58%	42%	715 Iranian adults	Persian/Farsi
Coronavirus anxiety Scale (CAS)	Lee, 2020	Convenience	Amazon's Mechanical Turk	11-13 March	32.72	9.35	-	58%	42%	775 US adults	English
COVID-19 – Impact on quality of life (COV19-QoL)	Repišti et al., 2020	Convenience	Google Forms	-	40.28	11.34	17-89	28%	72%	1346 Croatian adults	Croatian
					44.62	12.06	17-93	47%	53%	201 adults with severe mental illness (4 countries)	?
COVID Stress Scales (CSS)	Taylor et al., 2020a	Sampling quotas	Qualtrics	21 March to 1 April	49.8	16.2	18-94	53%	47%	3479 Canadian adults	English
COVID-19 Phobia Scale (C19P-S)	Arpaci et al., 2020	Convenience	Qualtrics	-	37.53	16.94	17-89	39%	61%	3375 US adults	Turkish
					39.66	16.87	12-92	40%	60%	1250 adults (used for EFA) 2143 adults (used for CFA)	
Panic Buying Scale (PBS)	Lins and Aquino, 2020	Snowball	-	10 April - 4 May	42.58	14.74	-	36%	64%	393 Brazilian adults	Brazilian Portuguese
COVID-19 Related psychological distress (CORPD)	Feng et al., 2020	Convenience and snowball	WeChat APP	18-21 April	-	-	17.3% over 45 years old	33%	67%	652 Chinese adults	Chinese
Med-COVID-19 Scale	Mejia et al., 2020	-	-	-	-	-	-	-	-	400 Peruvians University staff	Spanish
Pandemic related Pregnancy Stress Scale (PREPS)	Preis et al., 2020	-	Qualtrics	24 April - 15 May	30.81	4.66	-	-	-	4451 US pregnant women	English
COVID-19 Anxiety Syndrome Scale (C-19ASS)	Nikčević and Spada, 2020	Convenience	Amazon's Mechanical Turk	1-7 June	37.2	10.09	20-74	66%	34%	292 US adults	English
				8-15 June	38.6	11.02	20-75	61.03%	39%	426 US adults	

infection of other people that present with somatic symptoms constitutes an important source of distress (as well as a possible defense mechanism) that has not been included in previous instruments.

3.1.8. MED-COVID-19

This scale was developed in Peru in order to measure the impact of media on the general population (fear induction or soothing results) and their informative role regarding the COVID-19 pandemic (Mejia et al., 2020). It contains 12 items rated on a 5-point Likert scale. Validation was conducted based on 30 experts of relevant specialties and it showed a good Cronbach's α value ($\alpha > 0.80$).

3.1.9. Pandemic related pregnancy stress scale (PREPS)

Special challenges emerge for pregnant women due to the COVID-19 pandemic (e.g. limited social support, difficulties in accessing prenatal care). The multi-dimensional stress that COVID-19 poses on this population can be assessed with the use of PREPS (Preis et al., 2020). The scale contains a total of 15 items that form three different factors (perinatal infection stress, preparedness stress and positive appraisal). The answers are given on a 5-point Likert scale. It is suggested that it can be used to detect pandemic-related risk and resilience factors.

3.1.10. COVID-19 anxiety syndrome scale (C-19ASS)

This instrument measures anxiety symptoms related to COVID-19 using a 9-item 5-point Likert scale (Nikčević and Spada, 2020). The authors conducted two studies that led to a two-factor structure focusing on perseverate thinking (C-19ASS-P) and avoidance behaviors (C-19ASS-A). In their study, both C-19ASS-P and C-19ASS-A showed

positive correlations with the COVID-19 perceived threat questionnaire (PCTQ), while the first one also correlated positively with COVID-19 anxiety scale (CAS). Both factors had more than acceptable Cronbach values ($\alpha = 0.86$ and $\alpha = 0.77$ respectively).

Table 2 presents questionnaire characteristics that were used in the reviewed studies.

Table 3 presents the assessment of studies' Methodological Quality based on COSMIN criteria. The inter-rater agreement was measured by the Kappa test, with a score of 0.86.

The summarized psychometric consensus ratings (as described by Terwee et al., 2012) of all questionnaires are presented in Table 4.

4. Discussion

This review aimed to examine the instruments that have been developed and validated to detect the psychological impact of COVID-19. Although there was a variety in their construct, most scales were developed to explore symptoms of stress, anxiety and fear (Ahorsu et al., 2020; Feng et al., 2020; Lee, 2020; Mejia et al., 2020; Nikčević and Spada, 2020; Taylor et al., 2020a) and one of corona phobia (Arpaci et al., 2020). Other scales have moved away from these content domains in their development and have attempted to measure other aspects like buying behaviours (Lins and Aquino, 2020) or impact on quality of life (Repišti et al., 2020). Most of those studies addressed the general population or students. Repišti et al. (2020) reported findings from both the general and clinical population and Preis et al. (2020) studied pregnancy-related stress in pregnant women.

Table. 2
Questionnaire characteristics.

Scale Name	Domains	No. items	Response format	Cronbach's alpha	EFA	CFA	Fit indices	Cutoff score
FCV-19S Ahorsu et al., 2020	Fear	7	5-point Likert-type scale	.82	✓	-	CR 0.88 AVE 0.51 SEM 1.89 Rasch analysis: PSR 0.77 PSI 2.82 ISR 0.99 ISI 11.45	NR
CAS Lee, 2020	Dysfunctional anxiety and fear Fear of social interaction	5	5-point Likert-type scale	.93	✓	✓	CFI 1.00 TLI 1.00 SRMR 0.01 RMSEA 0.00	≥ 9 indicates dysfunctional levels of anxiety (90% sensitivity and 85% specificity) NR
COV19-QoL Repisti et al., 2020	Quality of life	6	5-point Likert-type scale	.88 0.85	✓	-	n/a	NR
CSS Taylor et al., 2020a	Fear Xenophobia Compulsive checking and reassurance seeking Traumatic stress symptoms	36	5-point Likert-type scale	>0.80	✓	✓	CFI > 0.92 RMSEA 0.05 SRMR 0.053	NR
C19P-S Arapci et al., 2020	Phobia reactions	20	5-point Likert-type scale	.85 to 0.90	✓	✓	GFI 0.97 AGFI . 96 NFI 0.98 IFI 0.98 TLI 0.98 CFI 0.98 RMSEA 0.03	NR
PBS Lins and Aquino, 2020	Buying behaviors in reaction to emotional distress	7	7-point Likert-type scale	.90	✓	-	GFI 0.97 CFI 0.99 TLI 0.98 RMSEA 0.07	NR
CORPDF Feng et al., 2020	Anxiety & Fear Suspicion	14	5-point Likert-type scale	.88	✓	✓	GFI 0.93 CFI 0.93 TLI 0.90 RMSEA 0.07 SRMR 0.06	NR
Med-COVID-19 Mejia et al., 2020	Fear perception and magnitude in the face of COVID-19 pandemic	12	5-point Likert-type scale	>0.80	✓	-	CFI 0.96 GFI 0.99 TLI 0.93 RMSEA 0.12	NR
PREPS Preis et al., al., 2020	Pregnancy specific pandemic-related stress	15	5-point Likert-type scale	> 0.70			CFI > 0.90 TLI > 0.90 RMSEA 0.08 SRMR 0.08	NR
C-19ASS Nikčević and Spada, 2020	Avoidance Checking Worrying Threat monitoring concerns	9	5-point Likert-type scale	.84	✓	✓	CFI 0.99 TLI 0.99 RMSEA 0.02 SRMR 0.026	NR

Note. NR, not reported; EFA, Exploratory Factor Analysis; CFA, Confirmatory Factor Analysis; CR, Composite Reliability; AVE, Average Variance Extracted; SEM, Structural Equation Modelling; PSR, Person Separation Reliability; PSI, Person Separation Index; ISR, Item Separation Reliability; ISI, Item Separation Index, CFI, Comparative Fit Index; TLI, Tucker-Lewis Index; SRMR, Standardized Root Mean Square Residual; RMSEA, Root Mean Square Error of Approximation; GFI, Goodness of Fit Index; AGFI, Adjusted Goodness of Fit; NFI, Normed Fit Index; IFI, Incremental Fit Index.

Table. 3
Assessment of study's Methodological Quality based on COSMIN criteria.

	BOX 1	BOX 2	BOX 3	BOX 4	BOX 5	BOX 6	BOX 7	BOX 8	BOX 9	BOX 10
FCV-19S Ahorsu et al., 2020	Inadequate	Adequate	Very good	Very good	NA	Doubtful	Adequate	Inadequate	NA	NA
CAS Lee, 2020	Inadequate	Adequate	Very good	Very good	NA	Doubtful	NR	Adequate	NA	NA
COV19-QoL Repisti et al., 2020	Inadequate	Adequate	Inadequate	Very good	NA	Doubtful	Doubtful	NR	NA	NA
CSS Taylor et al., 2020a	Very good	Adequate	Very good	Very good	NA	Doubtful	NR	NR	NA	NA
C19P-S Arapci et al., 2020	Inadequate	Adequate	Very good	Very good	NA	Doubtful	NR	Doubtful	NA	NA
PBS Lins and Aquino, 2020	Inadequate	Adequate	Adequate	Very good	NA	Doubtful	NR	Doubtful	NA	NA
CORPDF Feng et al., 2020	Inadequate	Adequate	Very good	Very good	NA	Doubtful	NR	Doubtful	NA	NA
Med-COVID-19 Mejia et al., 2020	Inadequate	Adequate	Inadequate	Very good	NA	Doubtful	NR	Inadequate	NA	NA
PREPS Preis et al., al., 2020	Inadequate	Adequate	Inadequate	Very good	NA	Doubtful	NR	Doubtful	NA	NA
C-19ASS Nikčević and Spada, 2020	Adequate	Adequate	Very good	Very good	NA	Doubtful	NR	Adequate	NA	NA

Note. NA, not applicable; NR, not reported; Prom Design (Box 1); Content validity (Box 2); Structural validity (Box 3); Internal Consistency (Box 4); Cross cultural validity (Box 5); Reliability (Box 6); Measurement error (Box 7); Criterion validity (Box 8); Hypotheses testing (Box 9); Responsiveness (Box 10).

4.1. Quality of included studies

All studies had a cross-sectional design and intended to present a newly formed questionnaire and to report on the outcomes resulting from the developed questionnaire. Although four studies ([Ahorsu et al., 2020](#); [Arapci et al., 2020](#); [Mejia et al., 2020](#); [Repisti et al., 2020](#)) did not mention the exact days of the survey timeline, all studies were conducted early in the pandemic (from March to June). The way missing items were handled was clearly described in only one of the studies ([Lee, 2020](#)). Test of normality was presented in five studies ([Arapci et al., 2020](#); [Feng et al., 2020](#); [Lee, 2020](#); [Lins and Aquino, 2020](#); [Nikčević and Spada, 2020](#)). Due to the sampling method used, the samples were not representative in all studies except for Taylor's study ([Taylor et al., 2020a](#)). Overrepresentation of females was reported in four studies ([Arapci et al., 2020](#); [Feng et al., 2020](#); [Lins and Aquino,](#)

[2020](#); [Repisti et al., 2020](#)), whereas males overpowered females in two studies ([Ahorsu et al., 2020](#); [Lee, 2020](#)) with a disproportionately higher level of male respondents found in one study ([Nikčević and Spada, 2020](#)). In one of the studies ([Mejia et al., 2020](#)) there was no reference to respondents' gender, while in another ([Preis et al., 2020](#)) the target group was exclusively females.

Piloting the data was mentioned in three studies ([Ahorsu et al., 2020](#); [Mejia et al., 2020](#); [Taylor et al., 2020a](#)) but without fully reporting the results. Minimal important change (statistic) was mentioned in one study only ([Repisti et al., 2020](#)).

Lee's study (2020) was the only one providing a validity item for the purpose of identifying and eliminating respondents who may undermine the study's results by not appropriately attending to the questionnaire's content.

The majority of the included studies were administered online

Table. 4
Assessment of Psychometric Quality based on Terwee et al.

		Content validity	Internal consistency	Criterion validity	Construct validity	Reproducibility Agreement		Reliability	Responsiveness	Floor and ceiling effects	Interpretability
1.	FCV-19S Ahorsu et al., 2020	+	+	?	+	+	?	?	+	0	0
2.	CAS Lee, 2020	+	+	?	+	0	+	+	0	0	?
3.	COV19-QoL Repišti et al., 2020	+	+	+	+	+	+	+	0	0	0
4.	CSS Taylor et al., 2020a	+	+	?	+	+	+	+	0	0	?
5.	C19P-S Arpacı et al., 2020	+	+	?	+	0	0	?	0	0	+
6.	PBS Lins and Aquino, 2020	+	+	?	-	0	0	0	0	0	0
7.	CORPD Feng et al., 2020	+	+	?	+	0	0	0	0	0	+
8.	Med-COVID-19 Mejia et al., 2020	+	+	?	?	0	0	0	0	0	0
9.	PREPS Preis et al., 2020	+	+	?	?	0	0	0	0	0	0
10.	C-19ASS Nikčević and Spada, 2020	+	+	+	+	0	+	+	0	0	+

Note. Rating: + Positive rating; ? Indeterminate rating; - Negative rating; 0 No information available.

(Repışti et al. (2020) used a phone-based technique) and reported on sample demographics, inclusion/exclusion criteria, and sample size (range of sample sizes 393–6854). These samples were derived from several countries across Europe, Asia and the United States. In line with other studies (Mughal et al., 2020) the region of Middle and North Africa was not represented by a single study, possibly highlighting the difficulties presented to scientists in Africa when trying to publish validation papers.

Internal consistency was assessed mainly by Cronbach's alpha and reliability and measurement errors were rarely mentioned (Repışti et al., 2020). Most of the studies reported a Cronbach's α between 0.80–0.90, while two studies reported higher than 0.90 (Lee, 2020; Lins and Aquino, 2020).

The dominant technique used to assess construct validity was the Principal Component Analysis (PCA) with some kind of rotation. Of a total of 10 studies, six analyzed the data using PCA and used eigenvalue as the criterion for the definition of factors. Convergent and discriminant validity was assessed by measures not tied to COVID-19, as most of the studies took part in the acute phase of the pandemic when only few questionnaires were published. Moreover, the majority of the studies did not include structured diagnostic interviews so they were unable to evaluate criterion-related (known-groups) validity or identify the specificity and sensitivity of the scales.

Most of the studies had adequate fit indices except for one (Mejia et al., 2020) where the Comparative Fit Index and Tucker-Lewis Index failed to reach levels above the accepted cutoff values to support the factorial models.

In general, the evaluation of the overall methodological quality of the included studies may be untimely as many psychometric data were missing or resulted from biased study designs or preliminary statistical analyses. Despite this obstacle, most studies provided useful tools to the researchers to assess the psychological aftermath of the pandemic in time. On top of that, Lee's study (2020) came up with a cutoff score, highly useful in clinical practice to distinguish dysfunctional levels of anxiety and fear from normal reactions. In addition, Taylor's study (2020) managed to introduce not only psychological but also social domains as well (i.e. fears regarding economic consequences; xenophobia), highlighting the multidimensional nature of the COVID-19 stress.

COVID-19 researchers tend to use shorter questionnaires as much as possible. Five out of the 10 newly developed questionnaires had less than 10 items. This makes sense, since shorter questionnaires enable easier administration in ways that respect the need for physical

distancing (web, telephone etc.), facilitate simultaneous administration of other research tools and repeatability of the administration, while reducing drop-out rates. It comes as a response to the need for original research regarding the pandemic, which can actually be highlighted by the fact that by 1/05/2020 more than half of the COVID-19 related publications did not contain any data and were mainly opinion articles (Raynaud et al., 2021). Those five questionnaires had also the most translations, probably as a result of easier and more accurate translation procedures and they have been used in several studies. Finally, time efficient diagnostic tools are highly appreciated at a clinical level, especially when working under extreme situations such as the COVID-19 pandemic.

4.2. Limitations

This review relied on a relatively limited number of databases for the identification of potentially eligible studies, focusing on those that were available without a subscription, hence data that is more widely and easily assessed. This was chosen aiming to a timelier completion of the research. In this review only peer-reviewed papers were included, so some studies were excluded even if they had reported significant and reliable results. Some of these studies may have been available as pre-prints at that time, so soon after the conclusion of our search they may have been made available as peer-reviewed articles. In addition, many studies have been published as letters to the editor or commentaries (e.g. Qiu et al., 2020), it is therefore not clear if they were peer reviewed. An overview of the scales that were finally excluded from the study is presented in supplementary table S1.

5. Conclusions

This study set out to review in detail the available psychometric tools developed specifically to study the psychosocial impact of the COVID-19 pandemic. The results of this study indicate that although it is difficult to follow the strict methodological criteria for conducting flawless studies during a pandemic, the tools that have been created provided acceptable psychometrics and are of adequate quality.

Declaration of Competing Interest

The authors have no conflicts of interest to disclose.

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Supplementary materials

Supplementary material associated with this article can be found, in the online version, at [doi:10.1016/j.psychres.2021.114183](https://doi.org/10.1016/j.psychres.2021.114183).

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