

# A SYSTEMATIC REVIEW OF PSYCHOMETRIC PROPERTIES OF WORKPLACE RESILIENCE MEASUREMENT SCALES

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The assessment of staff resilience at work and the following assessment of the effectiveness of interventions aimed at increasing the resilience of the employees requires valid and reliable instruments. The purpose of this systematic review was assessing the psychometric properties of workplace resilience measurement scales. Four electronic databases including PUBMED, Web of Science, SCOPUS, and Google Scholar were searched using keyword “resilience” combined with “instruments,” “tool,” “inventory,” “questionnaire,” “scale,” “workplace,” “staff,” and “occupational” with Boolean operators OR and AND. Two of the authors, independently, assessed the process of data gathering and the quality of psychometric properties of the tools using Terwee et al. (2007) study. We found 11 instruments, none of which covered all aspects of psychometric properties of the Terwee criteria. Because of the recent development of many of the staff resilience assessment instruments, it seems they need more time to be assessed properly. Besides, due to the different nature of different occupations, and differing cultures and backgrounds, there is a need for the development of the staff resilience at workplace assessment instruments convenient for the local needs.

**Keywords:** Resilience; Workplace; Psychometric properties; Scale; Staff.

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Resilience has become a subject of interest in recent decades (Haskett, Nears, Ward, & McPherson, 2006). There are different approaches and definitions for the resilience assessment; for example, as “a developmental process” (American Psychological Association, 2014), “a developmental consequence”

(Masten, 2001), “a potential” (Luthans, Vogelgesang, & Lester, 2006), “a personal quality” (Ahern, Ark, & Byers, 2008), or “a psychological attribute, cycle or class” (Jackson, Firtko, & Edenborough, 2007). In the viewpoint that considers resilience as an attribute, resilience is either distinct and constant personal feature or a combination of different personal capabilities (Wanberg & Banas, 2000). If considered as a state-like attribute, resilience in capacity perspective is considered as developable via training and flexible in the long term despite being stable over certain periods (Luthans, 2002). When considered as a process, resilience develops as a response to a series of events and leads to positive compatibility (McLarnon & Rothstein, 2013; Moenkemeyer, Hoegl, & Weiss, 2012). Despite the lack of a singular and universal definition for resilience (Winwood, Colon, & McEwen, 2013), experts agree on three main features: 1) preserving psychological wellbeing; 2) increasing compatibility; and 3) the ability to return to the previous function level (Garroway, 2014; Reis, Colbert, & Hébert, 2004). Windle (2011) defines resilience as a process of effective negotiation, compatibility, and stress and disaster management in which internal and external personal resources facilitate compatibility and “bounce back” processes when one faces difficulties (Windle, 2011).

Workplace resilience studies are based on positive psychology and its emphasis on positive human capabilities (Luthans, 2002; Seligman & Csikszentmihalyi, 2000). Workplace resilience has been studied in a different range of industries and professions such as public business organizations (e.g., Shin, Taylor, & Seo, 2012), health services (e.g., Gabriel, Diefendorff, & Erickson, 2011), or military (e.g., Lee, Sudom, & Zamorski, 2013).

There are a variety of workplace resilience definitions too: the ability of the personnel to counter stressful conditions and their return to previous or better functions (Mallak & Yildiz, 2016), or personal capability that allows one to empower one’s self with the available resources and gains successful compatibility and flourishes at work (Malik & Garg, 2018). Another definition considers resilience as a combination of features, processes, and support systems that enables the personnel to return to their previous functional status and health conditions after experiencing traumatic or stressful conditions (McLarnon & Rothstein, 2013). Resilient personnel have increased awareness, are more flexible, are capable of improvisation, and are more compatible with rapid changes (Coutu, 2002). Resilience affects the reactions to workplace experiences giving the more resilient personnel an edge in daily challenges at work (Coutu, 2002; Fleig-Palmer, Luthans, & Mandernach, 2009).

Previous studies have shown a positive relationship between resilience and occupational performance (Luthans, Avolio, Avey, & Norman, 2007; Luthans, Avolio, Walumbwa, & Li, 2005), preservation of higher motivation and workplace efforts (Jung, & Yoon, 2015), and its positive relationship with staff assessment of their occupational successes (Wei & Taormina, 2014). Moreover, resilience affects physical and mental health, attitude towards the occupation, and acceptance of workplace environment changes (Hartmann, Weiss, Newman, & Hoegl, 2019).

The assessment of interferences and policies made to increase staff resilience requires valid and stable instruments. To ensure the quality of the gathered data by these instruments it is imperative to assess their validity and stability, meaning that the goal of measurement, target group (responders), the timing of the response, the person to whom the participants respond, must be clarified. The desired instrument has to be accepted by the responders and its items mirror the intended concepts and theories. It is ideal to have an independent “golden standard” during instrument design (Kotzé & Nel, 2013; Streiner, Norman, & Cairney, 2015); however, there has been no consensus between researchers about how to assess the workplace resilience at the personal level (Hartmann et al., 2019).

The aim of a methodological review is to diagnose, compare, and critically assess the validity and psychometric criteria of different instruments that share the same concept by utilizing quality assessment

tools which analyse different features of the aforementioned instruments and recommend the most appropriate instrument for certain populations based on the acquired data (Terwee et al., 2007).

There are review studies that have assessed general resilience instruments (Ahern, Kiehl, Lou Sole, & Byers, 2006; Windle, Bennett, & Noyes, 2011); however, there has not been a systematic study of workplace staff resilience instruments. Thus, we designed this study to assess the psychometric criteria of self-reported workplace resilience assessment instruments by using the quality criteria suggested by Terwee et al. (2007). A comprehensive set of quality criteria was designed to evaluate the psychometric criteria of health-related instruments that included content validity, internal consistency, criterion validity, construct validity, reproducibility, responsiveness, ceiling and floor effects, and interpretability. These features are mentioned in Table 1 reprinted from Windle et al. (2011) study.

## METHODS

This is a quantitative methodological review that utilizes systemic principles (Moher, Liberati, Tetzlaff, & Altman, 2009) of searching, screening, assessment of quality criteria, data extraction, and handling.

### Search Strategy and Inclusion Criteria

International databases including PubMed, Web of Science, SCOPUS, and Google Scholar were systematically searched for published researches from 1989 to August 1st, 2019. The search keywords and strategies followed included: “resilience,” “instruments,” “tool,” “inventory,” “questionnaire,” “scale,” “workplace,” “staff,” and “occupational” with Boolean operators OR and AND — resilience AND (tool OR measure OR scale OR questionnaire OR inventory OR instrument) AND (workplace OR employee OR professional). Besides, a general search in the google search engine for “resilience instrument” was performed. The resources of other articles were manually assessed. The inclusion criteria were: 1) original articles on the designing of self-reported instruments assessing resilience at the workplace or profession-related ones; 2) assessment of psychometric criteria included in the study; 3) “resilience” as the key-word; 4) only English language studies were assessed. Studies that only assessed the team or organisation resilience or were not self-reported were excluded. All synonyms of the keywords were searched using Medical Subject Headings (MESH) strategy.

### Data Extraction and Qualitative Assessment

First, every search result was listed in the Endnote software and repeated results were omitted. Next, two separate reviewers assessed the titles and abstracts of the search results to pick the articles that matched the inclusion criteria. After the articles entered the study, their full texts were extracted and assessed. In case of any contradiction between the two reviewers, other reviewers made the final decision. The primary search produced 3,057 articles; this number decreased to 2,625 articles after omitting the repeated results, books, and conference-related search results. The screening then omitted 2,337 results based on their titles, and 276 of them after assessment of their abstracts. Out of the 12 remaining articles, one was not a self-report and so was excluded. The remaining 11 articles entered our study. Figure 1 shows the stages of selecting the articles in accordance with PRISMA principles (Moher et al., 2009).

TABLE 1  
Scoring criteria for the quality assessment of each resilience measure

Property	Definition	Quality criteria
1 Content validity	The extent to which the domain of interest is comprehensively sampled by the items in the questionnaire (the extent to which the measure represents all facets of the construct under question)	+ 2 A clear description of measurement aim, target population, concept(s) that are being measured, and the item selection AND target population and (investigators OR experts) were involved in item selection
		? 1 A clear description of above-mentioned aspects is lacking OR only target population involved OR doubtful design or method
		– 0 No target population involvement
		0 0 No information found on target population involvement
		0 0
2 Internal consistency	The extent to which items in a (sub)scale are intercorrelated, thus measuring the same construct	+ 2 Factor analyses performed on adequate sample size (7* #items and $\geq 100$ ) AND Cronbach's alpha(s) calculated per dimension AND Cronbach's alpha(s) between .70 and .95
		? 1 No factor analysis OR doubtful design or method
		– 0 Cronbach's alpha(s) $< .70$ or $> .95$ , despite adequate design and method
		0 0 No information found on internal consistency
		0 0
3 Criterion validity	The extent to which scores on a particular questionnaire relate to a gold standard	+ 2 Convincing arguments that gold standard is "gold" AND correlation with gold standard $\geq .70$
		? 1 No convincing arguments that the gold standard is "gold" OR doubtful design or method
		– 0 Correlation with gold standard $< .70$ , despite adequate design and method
		0 0 No information found on criterion validity
		0 0
4 Construct validity	The extent to which scores on a particular questionnaire relate to other measures in a manner that is consistent with theoretically derived hypotheses concerning the concepts that are being measured	+ 2 Specific hypotheses were formulated AND at least 75% of the results are in accordance with these hypotheses
		? 1 Doubtful design or method (e.g., no hypotheses)
		– 0 Less than 75% of hypotheses were confirmed, despite adequate design and methods
		0 0 No information found on construct validity
		0 0
5 Reproducibility		
5.1 Agreement	The extent to which the scores on repeated measures are close to each other (absolute measurement error)	+ 2 SDC $<$ MIC OR MIC outside the LOA OR convincing arguments that agreement is acceptable
		? 1 Doubtful design or method OR (MIC not defined AND no convincing arguments that agreement is acceptable)
		– 0 MIC $\leq$ SDC OR MIC equals or inside LOA despite adequate design and method

(Table 1 continues)

Table 1 (continued)

Property	Definition	Quality criteria	
5.2 Reliability	The extent to which patients can be distinguished from each other, despite measurement errors (relative measurement error)	0	No information found on agreement
		0	
		+	ICC or weighted Kappa $\geq 0.70$
		2	
		?	Doubtful design or method
6 Responsiveness	The ability of a questionnaire to detect clinically important changes over time	1	
		–	ICC or weighted Kappa $< 0.70$ , despite adequate design and method
		0	
		0	No information found on reliability
		0	
7 Floor and ceiling effects	The number of respondents who achieved the lowest or highest possible score	+	SDC or SDC $< MIC$ OR MIC outside the LOA
		2	OR RR $> 1.96$ OR AUC $> 0.70$
		?	Doubtful design or method
		1	
		–	SDC or SDC $\geq MIC$ OR MIC equals or inside LOA OR RR $\leq 1.96$ or AUC $< 0.70$ , despite adequate design and methods
8 Interpretability	The degree to which one can assign qualitative meaning to quantitative scores	0	
		0	No information found on responsiveness
		0	
		+	$\leq 15\%$ of the respondents achieved the highest or lowest possible scores
		2	
		?	Doubtful design or method
		1	
		–	$> 15\%$ of the respondents achieved the highest or lowest possible scores, despite adequate design and methods
		0	
		0	No information found on interpretation
		+	Mean and SD scores presented of at least four relevant subgroups of patients and MIC defined
		2	
		?	Doubtful design or method OR less than four subgroups OR no MIC defined
		1	
		0	No information found on interpretation
		0	

Note. In order to calculate a total score  $+ = 2$ ;  $? = 1$ ;  $- = 0$ ;  $0 = 0$  (scale of 0-18).

SDC = smallest detectable difference (this is the smallest within the person change, above measurement error. A positive rating is given when the SDC or the limits of agreement are smaller than the MIC); MIC = minimal important change (this is the smallest difference in score in the domain of interest which patients perceive as beneficial and would agree to, in the absence of side effects and excessive costs); SEM = standard error of measurement; AUC = area under the curve; RR = responsiveness ratio. LOA = limit of agreement; ICC = intraclass correlation coefficient.

Reprinted from “A methodological review of resilience measurement scales,” by G. Windle, K. M. Bennett, & J. Noyes, 2011, *Health and Quality of Life Outcomes*, 9, Article 8 (doi:10.1186/1477-7525-9-8). Copyright 2011 by Windle et al.

### Assessment of the Psychometric Quality of the Instruments

The quality of the psychometric properties of the scales was assessed using a qualitative framework including content validity, internal consistency, criterion validity, construct validity, reproducibility, responsiveness, roof/ceiling effect, and interpretability in accordance with qualitative criteria of Terwee et al. (2007). In Table 1 the full description of the criteria and the scoring process are listed. A full score (a +

score) was given when the design, the sample size, the implementation, analysis, and the results were properly done. If the aforementioned items were incomplete, the studies received a medium score. Those with poor results despite their proper design, a satisfactory sample size, implementation of the study, correct methodology and data analysis received a negative score. The least score (0) was given to studies with none of the intended items available. Thus, the score ranged between 0 and 18.

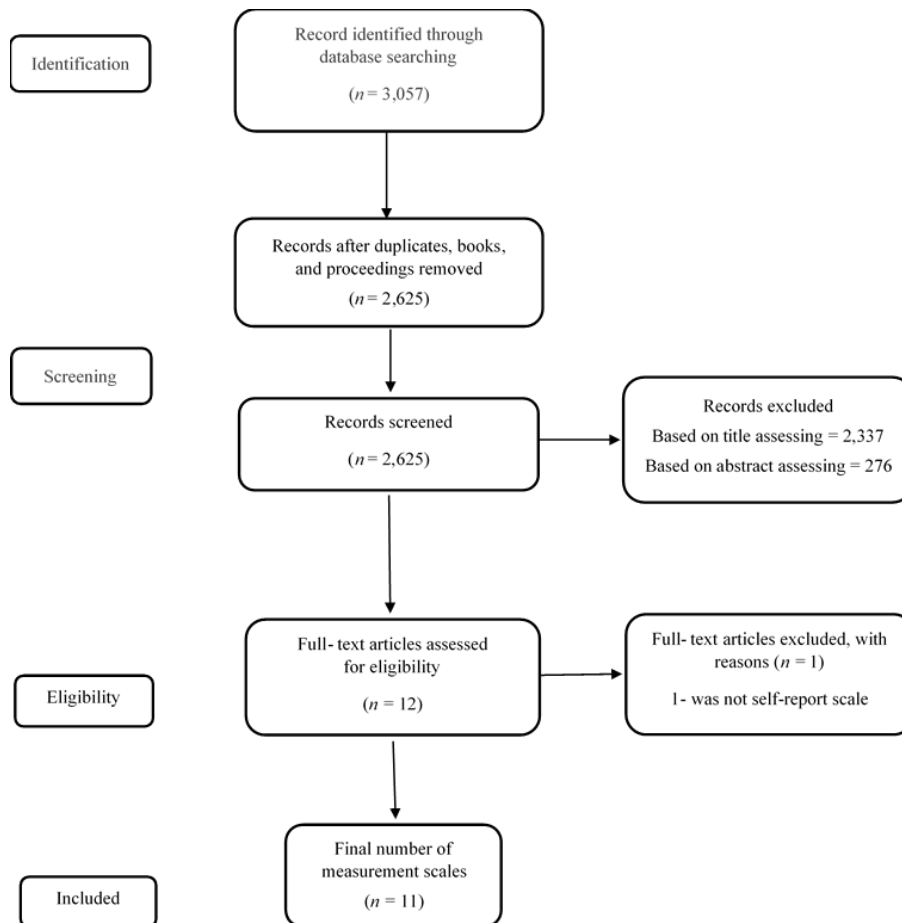


FIGURE 1  
PRISMA diagram.

## Results

This study inclusively assessed the design stages and validity of the self-reported scales assessing the resilience of the staff at the workplace. Eleven studies matched the inclusion criteria, one of them assessed the resilience of the leaders and teams as well as the staff, and another one assessed the resilience on three levels: personal, professional, and organisational. Table 2 provides a summary of the data of the assessed studies (Amir & Standen, 2019; Barcenilla González et al., 2018; Braun, Hayes, DeMuth, & Taran, 2017; Ebadi, Forutan, & Malekzadeh, 2019; Hodliffe, 2014; Magrin, Scignaro, Monticelli, & Gheno, 2016; Mallak & Yildiz, 2016; McLarnon & Rotheistien, 2013; Siu et al., 2009; Wei & Taormina, 2014; Winwood et al., 2013).

TABLE 2  
Description of the resilience workplace measures

	Measure	Author(s)	Participants in research	Mode of completion	Number dimension (items)	Purpose of the measure	Comments on theory and item selection
1	9-item resilience measure (among Chinese health care workers)	Siu et al. (2009)	Health care workers in Hong Kong and Mainland China	Self-report	1 (9)	Develop a resiliency measure which is satisfactory both in terms of internal consistency (Cronbach's alpha) and construct validity	Based on focus group discussion (FGD) and the selection of some items from other measures
2	A practical measure of workplace resilience (R@W) scale	Winwood, Colon, & McEwen (2013)	Participants were from different countries and diverse area of work	Self-report	7 (20)	Develop an effective measure of resilience at work for use in individual work-related performance and emotional distress contexts	Based on extant literature review and the experience of 25 years of work with various client group and various manufacturing industry group workers
3	Workplace Resilience Inventory (WRI)	McLarnon & Rothstein (2013)	Employed and currently employed students from a large Canadian university	Self-report	4 (60)	The purpose of this study is the development of a reliable psychometric measure of an individual's resiliency and to provide initial evidence of criterion validity	The theoretical background to the development of this scale is derived from King and Rothstein's study (2010) that provided the groundwork for the identification of the key elements of resiliency
4	A new multi dimensional measure of personal resilience and its use: Chinese nurse resilience, organizational socialization and career success	Wei & Taormina (2014)	Full-time nurses at two hospitals in China	Self-report	4 (40)	1. One purpose of this research was to analyze the most representative factors of resilience as researchable domains. 2. Provide a new definition of the term as being composed of several parts, namely, 'Personal resilience is a multifaceted construct that includes a person's determination and ability to endure, to be adaptable, and to recover from adversity'	Based on the construct from the literature, personal resilience was considered to have four major facets, namely, determination, endurance, adaptability, and recuperability

(Table 2 continues)



Table 2 (continued)

Measure	Author(s)	Participants in research	Mode of completion	Number dimension (items)	Purpose of the measure	Comments on theory and item selection
5 Employee Resilience Scale (EmpRes) (Final version)	Näswall, Kuntz, Hodliffe, & Malinen (2013)	Employees from an organization within the finance sector	Self-report	1 (9)	The present report outlines the development of an employee resilience measure (EmpRes), which organizations can use to monitor resilience levels in their staff, and identify areas contributing to the development of employee resilience	A deductive approach was used in the initial phase of scale development to produce a research-informed theoretical definition of Employee Resilience. Previous research, in particular, the Resilient Organizations Resilience Benchmark Survey by Resilient Organizations, was used as the basis for developing the theoretical dimensions that characterize the construct. And also the assistance of two subject matter experts (SMEs) from the Management Department at Canterbury University
6 Workplace Resilience Instrument (WRI)	Mallak & Yildiz (2016)	Executives and nurses working in the United States in hospital settings	Self-report	4 (20)	This study developed and tested a resilience instrument for employees in the workplace	The resilience items were written based on previous work by the lead author and inspired by Weick's sense-making theory
7 Occupational Resilience Assets Questionnaire (ORA-Q)	Magrin, Scignaro, Monticelli, & Gheno (2016)	Workers from several companies belonging to 8 different sectors of the labour market: industry, education system, university and research, construction, trade, public system, social services, and others	Self-report	3 (45)	To develop a questionnaire in three different levels (organizational, occupational, and personal) for assessing resilience resources at work	Organizational resilience based on four ad hoc questionnaire; Occupational resilience based on three ad hoc questionnaire; Personal resilience was assessed by the original short 13-item version of the Sense of Coherence Scale (Antonovsky, 1993)

(Table 2 continues)



Table 2 (continued)

Measure	Author(s)	Participants in research	Mode of completion	Number dimension (items)	Purpose of the measure	Comments on theory and item selection
8 Employee Agility and Resilience Measure	Braun, Hayes, DeMuth, & Taran (2017)	Employees exempt from the Fair Labor Standard Act	Self-report	7 (46)	This article focuses on the development, validation, and practical application of employee agility and resilience measurement scale as part of a program in support of an alternative approach to managing organizational change	This scale was developed for the assessment of individual change readiness, individual renewal, and collaboration. Openness to new experience, social support, and creating positive relationships scales have been adapted from previous tools. These tools have been modified for use in the workplace context (Barrera, Sandler, & Ramsay, 1981; Goldberg et al., 2006; Zimet, Dahlem, Zimet, & Farley, 1988)
9 Pilot Resilience Scale (employees, leaders, and teams)	Barcenilla González et al. (2018)	Workers from companies of Colombia	Self-report	3 (62)	The aim of this study was the development of a pilot resilience scale in Spanish that measures three aspects of workplace resilience: 1. individual resilience; 2. leadership resilience; and 3. team resilience	Item selection was done based on the Resilience Scale review and reviewed by experts in work psychology
10 Emergency medical services resilience scale (EMSRS)	Ebadi, Forutan, & Malekzadeh (2019)	EMS personnel	Self-report	6 (31)	This study was conducted to design a tool for assessing the resilience of emergency medical personnel in Iran and to examine the psychometric properties of the designed tool	Based on a qualitative study on EMS personnel and review of articles

(Table 2 continues)

Table 2 (continued)

Measure	Author(s)	Participants in research	Mode of completion	Number dimension (items)	Purpose of the measure	Comments on theory and item selection
11 Growth-focused resilience	Amir & Standen, (2019)	Managers with two or more direct reports, working in 12 large organizations in multiple industry sectors in Jakarta, Indonesia	Self-report	2 (16)	This paper aims to present an alternative construct in which resilience reflects an intention to grow as a person when facing both opportunities and difficulties	Items were selected from scales developed for adult samples in work or non-work settings and treating resilience as a developable capacity: CD-RISC (Connor & Davidson, 2003), the Brief Resilience Scale (Smith et al., 2008), the Resilience Scale for Adults (Friborg, Hjemdal, Rosenvinge, & Martinussen, 2003), Wagnild & Young's Resilience Scale (Wagnild, 2009; Wagnild & Young, 1993), Blatt's Resilience Scale (Blatt, 2009), Heuvel's Meaning Making Scale (van den Heuvel, Demerouti, Schreurs, Bakker, & Schaufeli, 2009), and Marsick and Watkins' Learning Organization Scale (Marsick & Watkins, 2003)

*Overall quality.* Table 3 shows the overall quality score of the scales as well as the individual score of the criteria included in those scales. Out of the 11 scales assessed according to the Terwee et al. (2007) criteria, three received a score of 8 including 9-item resilience measure, EMSRS, and Employee Agility and Resilience Measure; three scales managed a score of 7 including Workplace Resilience Instrument, growth-focused resilience, and Workplace Resilience Inventory; two of the scales received 6 including EmpRes and ORA-Q; and the remainder received a score of 4.

*Content validity.* To receive a full score, the article should have defined its goal, the measured item, target group, and the experts or researchers responsible for item production. All of the scales, save for the ORA-Q, received the full score in this part. The scales that had borrowed the questionnaire items from other articles but had taken their target group and experts into consideration in the finalising of their items received the full score either. In ORA-Q, however, despite using other questionnaires items, the target group had not been taken into consideration and so received a score of 1.

*Internal consistency.* The criterion for the full score in this section is to perform a factor analysis with an appropriate sample size of 7 per item or at least 100 people, and Cronbach's alpha between .70 and .95. According to this, eight of the assessed instruments received the full score. The Pilot Resilience Scale, however, did not receive a full score because, despite an acceptable Cronbach's alpha, the exploratory factor analysis (EFA) had been performed with less than the acceptable sample size. The instrument utilized in Wei and Taormina (2014) did not receive full score despite an acceptable Cronbach's alpha because they had failed to report the EFA. R@w scale despite its correct design had reported a Cronbach's alpha of less than .70 and so did not receive a full score. Mallak & Yildiz (2016) study reported a Cronbach's alpha below .70 too.

*Criterion validity.* It appears that there are no "golden standards" for criterion validity and resilience. However, some authors have suggested a concurrent validity or convergent validity that can be counted as a criterion validity. Based on this, as seven of the articles had used a concurrent validity a score of 1 was granted to them.

*Construct validity.* If there is not an acceptable golden standard available, construct validity can act as indirect evidence (Sikkes, De Lange-de Klerk, Pijnenburg, & Scheltens, 2008; Windle et al., 2011). Based on this presumption nine of the instruments out the 11 assessed received a full score.

*Reproducibility-Agreement.* We did not manage to find any relevant data.

*Reproducibility-Reliability (test-retest).* Only the EMSRS instrument received the full score because besides the performance of the test-retest the ICC was above 0.70 too. In the 9-item resilience measure, although the test-retest was performed, its agreement level was reported to be 0.68, so the full score was not considered.

*Responsiveness.* No relevant data in any of the articles were found.

*Floor/ceiling effect.* No relevant data in any of the articles were found.

*Interpretability.* Since there is no normative score for resilience, therefore, no comparisons have been made and no information has been reported in the studies.

## DISCUSSION

This study, aimed at systematically evaluating staff resilience self-report instruments, evaluated the psychometric properties of 11 instruments. None of the instruments examined utilised all of the psychometric properties proposed by Terwee and colleagues (Terwee et al., 2007). Even the top three scoring instruments are mediocre in this regard.

TABLE 3  
Summary of the quality assessment of the resilience workplace measures based on Terwee et al. (2007) criteria

	Measure	Content validity	Internal consistency	Criterion validity	Construct validity	Reproducibility agreement	Reproducibility reliability (test-retest)	Responsiveness	Floor/ceiling effect	Interpretability	Total
1	9-item resilience measure (among Chinese health care workers)	+	+	?	+	0	?	0	0	0	8
		2	2	1	2	0	1	0	0	0	
2	Emergency Medical Services Resilience Scale (EMSRS)	+	+	-	+	0	+	0	0	0	8
		2	2		2	0	2	0	0	0	
3	Employee Agility and Resilience Measure	+	+	?	+	0	?	0	0	0	8
		2	2	1	2	0	1	0	0	0	
4	Workplace Resilience Inventory (WRI)	+	+	?	+	0	0	0	0	0	7
		2	2	1	2	0	0	0	0	0	
5	Growth-focused resilience	+	+	?	+	0	0	0	0	0	7
		2	2	1	2	0	0	0	0	0	
6	Workplace Resilience Instrument (WRI)	+	+	?	+	0	0	0	0	0	7
		2	2	1	2	0	0	0	0	0	
7	Employee Resilience Scale (EmpRes)	+	+	-	+	0	0	0	0	0	6
		2	2		2	0	0	0	0	0	
8	Occupational Resilience Assets Questionnaire (ORA-Q)	?	+	?	+	0	0	0	0	0	6
		1	2	1	2	0	0	0	0	0	
9	Pilot Resilience Scale (employees, leaders, and teams)	+	?	-	?	0	0	0	0	0	4
		2	1		1	0	0	0	0	0	
10	A practical measure of workplace resilience (R@W) scale	+	-	-	+	0	0	0	0	0	4
		2	0	-	2	0	0	0	0	0	
11	A new multidimensional measure of personal resilience	+	?	?	0	0	0	0	0	0	4
		2	1	1	0	0	0	0	0	0	

In the 9-item resilience instrument (Siu et al., 2009), resilience is defined as the capacity to deal with or bouncing back after stressful situations or set back. The purpose of the design was to measure the resilience of health service staff in China. Properties of this instrument include the use of IgA salivary as a safety biomarker and a convergent measure that increases during stress.

The next instrument with the highest score on the Terwee et al.'s criteria was the EMSRS instrument (Ebadi, Forutan, & Malekzadeh, 2019). This tool is designed as a qualitative study on pre-hospital emergency personnel in Iran and is a specific measure of the resiliency of EMS staff. In this study, resiliency is considered as a dynamic individual, a cultural and contextual phenomenon that reduces occupational stress and enhances the quality of clinical services. This study provides a complete overview of the face validity, content validity with content validity index (CVI) and content validity ratio (CVR) as well as reliability with appropriate ICC reporting.

The Employee Agility and Resilience Measure tool contains seven aspects that include resilience and agility as part of them. The authors point out that if organizations develop resilience and agility skills at the individual level, the workforce will be more effective at implementing the intended changes. This study focuses on behavioural strategies aimed at workplace resilience that have been addressed in most resilience articles, including the availability of social support (receiving help from others and strong social networks), personal strategies aimed at empowerment (such as a physical activity), and building positive relationships (respecting others and protecting others). It is important to note that stress correlates with resilience and agility in both negative and positive ways (Braun et al., 2017).

Workplace Resilience Inventory (WRI) is based on the King and Rothstein (2010) model. In this model, resilience is neither viewed as a one-dimensional construct and nor as a pure consequence; rather, it is defined as a multidimensional construct and a labour-intensive process. In this functional model, workplace resilience is defined as a meaning-oriented and self-regulatory approach, recovery processes, and individual growth following major workplace incidents. King and Rothstein's model emphasises on personal capabilities and properties as well as on external support resources. WRI assesses the initial responses; personal characteristics; resources, opportunities, supports; and self-regulation processes (McLarnon & Rothstein, 2013).

Growth-focused resilience instrument defines resilience as a personal capacity for response to workplace difficulties that leads to one's growth and development thus moulding a better person. The authors argue that psychological resilience tools have focused a great deal on disaster recovery, however, the purpose of introducing their instrument was to attend to the commitments of individual growth in the face of both challenges and opportunities. The items in their instrument were borrowed from previous studies and tools (Amir & Standen, 2019).

Mallak & Yildiz (2016) believe that support-measures vary depending on whether the person is at the workplace, at home, or in a disaster. The theory is based on the expanded responding processes to resilience requiring situations. Their proposed definition of workplace resilience is the employees' ability to recover from a stressful situation and returning to baseline or even improved post-stress performances (Mallak & Yildiz, 2016).

The designers of EmpRes (Hodliffe, 2014; Näswall et al., 2013) claim that their definition of resilience surpasses the one Luthans suggested in 2002 (Luthans, 2002) which defined resilience as a recovery process in which a person returns to his primary balance. They define it as a transformational process in which the person faces the challenges, emerges victorious, learns from them and adapts with the new environment to make progress. Hence, resilience is regarded as an extendable construct rather than a fixed at-

tribute. Besides, the organizational environment also influences the employees' level of resiliency by providing them with enabling factors.

The authors of ORA-Q believe that other instruments focus on either individual resources or the social ones and these two have never been studied simultaneously. Their instrument evaluates three levels of organisational, professional, and individual resources. In the organisational section, employee support, providing a proper workspace, and increasing the sense of belonging have been taken into consideration. In the professional section, cognitive flexibility has been considered as a combination of the knowledge of the available options in each situation, the flexibility and adaptability to different conditions, and self-efficiency in terms of flexibility. In the individual section, the sense of coherence is defined as a combination of predictability of incentives, and availability of sufficient resources to cope with demands; it also emphasises that demands are worth investing. The same questionnaire was also used to measure individual resilience. The authors considered their "general" instrument useful for all personnel (Magrin et al., 2016). The instrument is user-friendly and useful in epidemiologic researches.

Barcenilla González et al.'s (2018) resilience scale evaluated resilience in employees, leaders, and teams. The items of this instrument were extracted from previous tools. The authors believe their instrument to be useful in other professions and sectors as well.

The items in R@W scale are designed using extensive literature review and 25 years of experience working with the staff of different professions from the health-care system to banks, education section, and other industries. The study focused on elements of resilience that are noticed consciously and deliberately and can be modified by proper training. This proves resilience is not limited to behaviours influenced by personality and genetically related strategies. The designed instrument focused on personnel capabilities and is not specific to any profession or environment (Winwood et al., 2013).

Wei and Taormina (2014) considered resilience a multidimensional process and assessed four major facets of it, as had been explained by previous articles, including "determination" (Bandura, 1989), "endurance" (Rutter, 2000), "adaptability" (Masten, 1994), "recuperability" (Tugade & Fredrickson, 2004). This study provides a new definition of resilience that incorporates several items.

### Limitations and Strengths of the Study

This study is based on a search of the Scopus, Web of Science, PubMed, Google Scholar databases. However, it is possible that a study may have been overlooked. In 2006, a study by Ahern et al. examined a limited number of available resilience tools. In 2011 another study by Windle et al. examined all available tools according to the Terwee et al.'s criteria (2007). Our search, however, found no studies on the psychometric properties of the workplace or occupational resilience instruments until then. Therefore, the information in this study allows the researchers to decide on the appropriate tool for their study.

One of the important issues in resilience studies is the attention to the context and culture. Various studies have suggested that resilience is a cultural construct (He & Van de Vijver, 2015; Shakespeare-Finch, Gow, & Smith, 2005; Southwick, Bonanno, Masten, Panter-Brick, & Yehuda, 2014; Tusaie & Dyer, 2004; Windle et al., 2011). Culture can shape the type of stressors people experience and influence the outcome of a given event (Aldwin, 2004). In agreement with the prominent and effective role of culture in resilience, Ungar and Liebenberg (2011) wrote: resilience is a trait that is relevant to the individuals and their context; because the social and cultural conditions of the individuals, affect her understanding and experience of hardship and the threat, their understanding of protective factors and how to use them; and in this

way the meaning of resilience can be formed for them. Therefore, it is necessary to examine, in the context of the culture and situation of one's life, the meaning of resilience (Ungar & Liebenberg, 2011). Our responses to stress and trauma come from interacting with other members of the society, available resources, specific cultures and religions, organizations, groups, and communities. Each of these substrates may be more or less resilient and therefore more or less capable of supporting the individuals (Southwick et al., 2014). Therefore, not all instruments are suitable for use in all societies and cultures; some are exclusively designed for a specific profession like EMERS (Ebadi et al., 2019).

The only instrument psychometrically based on data from participants in different countries is the R@W Scale. A study by Malik and Garg (2018) measured the psychometric properties of the R@W Scale tool with a sample of IT staff in India. The study reduced the number of factors to six and the number of questions to 17, meaning, the interacting cooperatively (IC) and building networks (BN) factors were combined and formed a new factor designated as "building social connections" (BSC) containing three items. Moreover, the reported Cronbach's alpha for the instrument as a whole was .81 and for its items were from .76 to .83. Researchers of this study did not find a similar study conducted using other instruments.

As Windle et al. (2011) point out in their study, the lack of complete information on the psychometric properties of the existing tools makes scoring on a number of criteria such as reproducibility and responsiveness impossible. Therefore, we also emphasize that low scores or failure to score on an item do not necessarily mean that the tool is weak or defective. Certainly, advances in instrument design will lead to newer instruments produced and more information about psychometric properties reported. In addition, it should be noted that not all criteria met by Terwee et al. (2007) can be derived in all types of tools.

#### Recommendation for Future Researches and Implications for Practice

Based on our findings, we felt the need for more comprehensive and detailed publication of data regarding stages of development and validity assessment of instrument design to for more accurate evaluation.

Due to the lack of complete access to the psychometric properties of available resilience assessment instruments recommending the use of any specific one of those we assessed is difficult. As demonstrated by other researchers (Sikkas et al., 2008; Windle et al., 2011) the reason an instrument is chosen is of great importance. Hartman et al. (2019) recommends the researchers clarify whether they view resilience as a trait, a potential, or a process as the development of different instruments is based on these definitions. Another neglected item in the assessment of an instrument is its applicability. A questionnaire that requires a long time to fill will not be welcomed by the target group (Windle et al., 2011). Out of the three highest-ranking instruments in our study (9-item resilience measure, EMSRS, Employee Agility and Resilience Measure), two had an optimal number of questions (9-item resilience measure, EMSRS). Besides, the target groups of these two tools were health workers. Therefore, to assess the resilience of health care groups, these tools can be used after localization.

However, if an inter-cultural instrument is intended, we recommend the R@W instrument because its development encompassed a wide range of participants from various countries and professions and its 20 items long questionnaire increases the accuracy of the responses. Despite its low ranking in our study, we suggest that the lack of criteria reported by its authors might be the cause.

ORA-Q with its assessment of three levels of resilience (organizational, occupational, personal) and the appropriate number of its questions can help those who intend to study these levels with regards to resilience.



## CONCLUSION

Workplace staff resilience assessment instrument studies are still evolving and so this topic requires further studies. We studied the psychometric properties of the currently available instruments, however, each of them has a different conceptualisation and has been developed in various cultural backgrounds. There was no golden standard to assess the construct validity of the instruments. Due to various conceptualizations of resilience, there is no singular reliable and valid instrument that can be in all professional groups and communities. Based on these conclusions we recommend more specialized, multi-faceted instruments be designed on the basis of the cultural backgrounds, the profession of the intended target group, and the available resources.

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