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Reliability and Validity of Scales Assessing Anxiety Associated with Information Related Tasks: A Systematic Review

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Abstract

This research carried out a systematic review of the evidence of reliability and validity of scales available in studies reporting surveys of individuals to measure anxiety associated with information related tasks such as library anxiety, information seeking anxiety, and information anxiety. A systematic search using keywords 'library anxiety', 'information anxiety', 'information seeking anxiety', and 'information seeking' AND 'anxiety' was carried in Web of Science, Scopus, LISA, and LISTA to identify the relevant literature. This review included those studies reporting the use of any scale measuring information related anxiety published in the English language and included all type of documents (e.g. journal articles, conference papers, book chapters, theses/dissertations, research reports). The two-phase screening process, title/abstract screening, and full-text screening resulted in 85 eligible studies which were reviewed in this paper. The data extracted from each study included author names, year of publication, scale title, type of construct assessed, number of items in the scale, sample characteristics, types of reliability and validity reported. The results revealed that most of the empirical studies did not report the reliability and validity of scales used for data collection. Nine instruments assessing information related anxieties were identified. These scales were heterogeneous in the number of statements and subscales and homogenous in the type of scale options. An internal consistency coefficient, such as Cronbach's alpha was the widely used reliability measure. Face validity, content validity, and construct validity either through exploratory factor analysis or confirmatory factor analysis were the most used validity measures. These results had quite serious implications on the inferences drawn by the practitioners and researchers based on the results of existing studies. The use of good-quality measures for assessing information related anxieties need to be promoted not only by the academicians but also by the journal referees and editors. This review would be a worthy contribution in the existing research on information related anxieties as no such study appears so far in this area.

Keywords: Information anxiety, Information seeking anxiety, Library anxiety, Scales, Reliability, Validity, Psychometrics.

Introduction

The presence of anxiety in information related tasks is and has been, of fundamental concern to information professionals. Several scholars addressed it in one way or the other with varied focus. As a result, it went through several transitions and was represented with varied labels,

namely, library anxiety, information seeking anxiety, and information anxiety (Erfanmanesh, Abrizah & Karim 2012; Mellon, 1986, Naveed, 2016, 2017; Naveed & Anwar, 2019, 2020; Wurman, 1989). Naveed and Anwar (2019) explained these three distinct but inter-related concepts while proposing a nested model of information anxiety which represented information anxiety as the general and broader concept while nesting information seeking anxiety as its sub-set and library anxiety as a further sub-set. Library anxiety refers to patrons' feelings of discomfort while interacting with library resources, services, and staff within a particular library whereas information seeking anxiety goes beyond the physical space of a library which may include – but is not limited to library anxiety and includes anxieties while looking for information from multiple sources including the library, the web, and human. On the other hand, information anxiety is an even more general and broader concept, embracing, but not limited to, information seeking anxiety.

This phenomenon was assessed mainly through self-assessment, a popular subjective method in which individuals report their perceived skill gaps, feelings, emotions, etc. A perusal of literature on anxiety associated with information related tasks reported many case studies on self-assessment, but very little has been known about the reliability and validity of scales used to measure information related anxieties. The present study, therefore, intends to systematically collect and review the evidence of development and use of self-assessment scales measuring anxiety associated with information related tasks reported in the literature. This research examined specifically the evidence of reliability and validity of such scales and addressed the following research questions (RQs):

1. How many studies used self-assessment scales to measure anxiety associated with information related tasks?
2. Which studies reported information on the reliability and validity of the scales they used?
3. What type of reliability and validity measures were reported by these studies?

Literature Review

There was a dearth of research addressing anxiety associated with information related tasks before the mid-1980s (Fine, 1984). A perusal of the published research resulted in three different concepts representing information related anxieties, namely, library anxiety, information seeking anxiety, and information anxiety. It was Mellon (1986) who theorized the concept of library anxiety grounded in students' understandings. She described that students experienced feelings of being lost, discomfort, and were afraid to approach library staff for help. A few years later, Kuhlthau (1988) developed a model of the library search process and reported anxiety as a fundamental, ubiquitous, and persistent characteristic in it. In 1989, the term information anxiety appeared in the best-selling book, namely, "*Information Anxiety*" by Richard Wurman who was an information architect. He defined it as the state "produced by the ever-widening gap between what we understand and what we think we should understand. It is the black hole between data

and knowledge, and it happens when information doesn't tell us what we want or need to know" (p. 34) and stated that it "can afflict us at any level and is as likely to result from too much information as too little information" (p. 44). However, it was worth noting that the World Wide Web was in either the embryonic stage or an infancy stage when these constructs were developed.

Since the development of these concepts, several researchers have developed scales of varied focus to measure these constructs quantitatively by using self-assessment methods. The literature on anxiety associated with information related tasks reported some self-rating anxiety scales developed mainly in academic settings especially at colleges and universities considering the contemporary information landscape (Anwar, Al-Qallaf, Al-Kandari, & Al-Ansari, 2012; Bostick, 1992; Erfanmanesh, Abrizah & Karim 2012; Van Kampen, 2004). Only a few researchers addressed this phenomenon in the workplace (Allison, 2006, 2008; Girard, 2005). Although the use of self-assessment methods to measure anxiety in information related tasks can be debated for their pros and cons as experts have challenged the accuracy of results derived through the self-rating methods because individuals with low ability overstate their abilities and do not have an empirical basis for their judgment (Rosman, Mayer, & Krampen, 2015). Despite this critique on self-assessment, it has a special diagnostic value and has been continuously used and reported in the literature by many researchers (Anwar, Al-Kandari & Al-Qallaf, 2004; Bostick, 1992; Doris, Provata, & Vraimaki, 2017; Erfanmanesh, Abrizah & Karim 2012; Naveed & Ameen, 2017a, 2017b; Rahimi, & Bayat, 2015; Song, Zhang, & Clarke, 2014; Van Kampen, 2004). The positive outcome of publishing case studies of self-assessment of information anxieties in the professional literature enables information professionals especially those engaged in providing information and research services in developing useful directions for need-based information literacy curriculum for reduction or alleviation of anxiety among individuals (Grandy, 2019; Naveed, 2016; Naveed & Ameen, 2016c).

The intent of researchers who developed various anxiety scales was to share their experiences and claim that their measurement scales were the best instruments for collecting data. These researchers invited others to benefit from their efforts and recommended the use of their instruments on different populations from varied geographical locales, contexts, and backgrounds. The quality of such instruments is expressed in terms of their reliability (the consistency that a scale measures a given construct) and validity (the degree of overlap/relationship between a measurement instrument and the construct it is intended to assess). Speyer, Pilz, Van Der Kruis, and Brunings (2011) emphasized that the exact knowledge of the psychometric characteristics of assessment scales being used is essential as the outcome of scales showing insufficient reliability and validity could not be interpreted correctly.

Methods and Procedures

The literature on anxiety associated with information related tasks was scattered in different sources due to its multi-disciplinary nature indicating that the citations related to this area needed

to be identified from multiple bibliographic databases. Web of Science and Scopus were not only general but also comprehensive bibliographic databases covering multiple disciplines whereas LISTA (Library, Information Science and Technological Abstracts) and LISA (Library and Information Science Abstracts) were specialized bibliographic databases covering literature in the field of Library Science, Information Sciences, and Information Management. It was presumed that searching of these databases would help researchers to find the maximum number of citations on the proposed phenomenon. Therefore, Web of Science, Scopus, LISTA, and LISA were searched by using the following terms: 'library anxiety', 'information anxiety', and 'information seeking anxiety'. Moreover, the term 'information seeking' combining with anxiety using 'AND' was also searched in these databases. This search was completed by the end of February 2020 resulted in 1609 citations, an encouraging initial sign. The details of the results are indicated in Table 1.

Table 1
Number of citations retrieved from various databases

Search Terms	Web of Science	Scopus	LISTA	LISA	Total
“Library Anxiety”	90	141	186	173	590
“Information Anxiety”	26	69	24	26	145
“Information Seeking Anxiety”	06	12	11	06	35
“Information Seeking” AND ‘Anxiety’	319	399	65	56	839
Total	441	621	286	261	1609

The identified citations were retrieved and imported to EndNote – the citation management software to deal with a high rate of duplication. These citations were examined one by one to eliminate duplicate and irrelevant citations resulting in 309 unique citations. Besides, the citations from the reference lists of available publications were also identified and accessed using Google Scholar. This process found 80 more citations that were not indexed in the databases searched. Thus, the data set consisting of 389 citations was utilized for analysis and to generate needed statistical reports. It is worth mentioning here that some of these citations were incomplete, lacking vital characteristics that were essential for scientometric analysis. These citations were completed using full-text papers.

Inclusion and exclusion criteria

This review included those studies reporting the use of any scale to measure anxiety associated with information related tasks. No limit for the year of publication was applied for the identification of research studies. Only those studies written in the English language were included. This study included all types of documents such as journal articles, conference papers, book chapters, theses/dissertations, reports for review. However, the documents that reported

similar results by the same authors were treated as a single study (e.g. thesis, journal articles, conference papers, and magazine articles). It is worth mentioning here that many studies used self-assessment anxiety scales but did not report any type of information for reliability and validity. All such studies were counted for answering the first question but excluded to answer questions two and three. Studies reporting other than the self-assessment method, literature review, and qualitative nature were excluded from this review.

Study selection and data extraction

Figure 1 presented the four-phase flow diagram explaining the screening process and selection of eligible studies for this review. The screening was done in two stages, title/abstract screening and full-text screening, which resulted in 85 eligible studies included in this systematic review. The data extracted from each eligible study included author names, year of publication, scale title, number of items in the scale, type of construct assessed, sample characteristics, types of reliability and validity reported. The common definitions of different types of reliability and validity measures were used by the authors for data extraction and its interpretation. These definitions given in Table 2 were taken from a similar study in the area of information literacy.

Table 2

Definitions of reliability and validity measures adopted in the review

Type of reliability and validity	Definition
Internal consistency reliability	How well items reflecting the same construct yield similar results
Test-retest reliability	The degree to which the same test produces the same results when repeated under the same conditions
Face/content validity	The degree to which an instrument accurately represents the skill or characteristic it is designed to measure, according to people's experience and available knowledge
Concurrent validity	The degree to which an instrument produces the same results as another accepted or proven instrument that measures the same variable
Predictive validity	The degree to which a measure accurately predicts expected outcomes
Construct validity	The degree to which a test measures the theoretical construct it intends to measure
Convergent validity	An estimate of the relationship between measures of constructs that are theoretically related
Discriminant validity	The extent that measures of constructs that are theoretically unrelated and are independent of one another

Sources: Crano, Brewer, and Lac (2014); Mahmood (2017); Ratanawongsa et al. (2008)

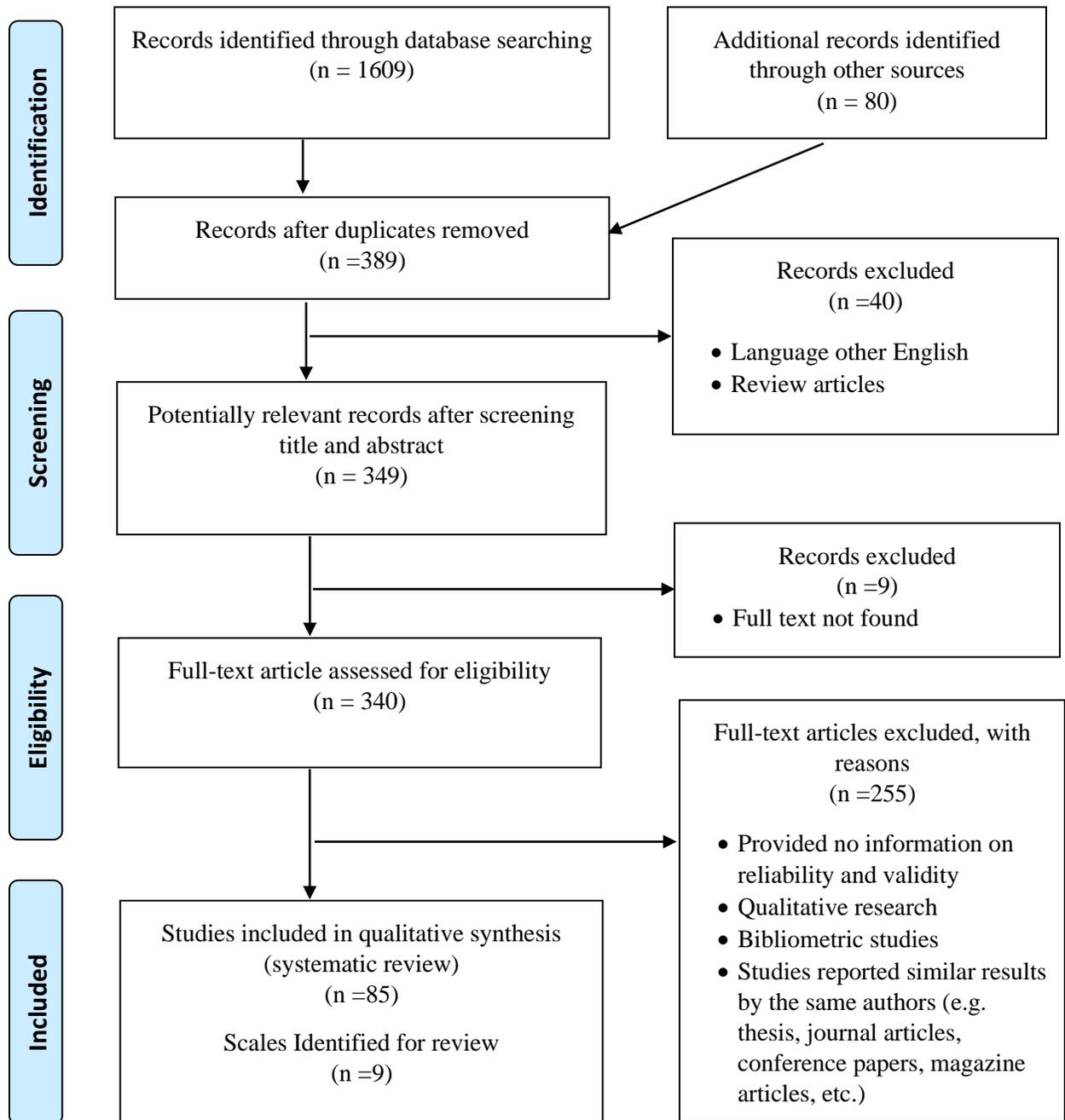


Figure 1. Four-phase flow diagram of the selection procedure for studies

Results

RQ1: Overview of studies

A systematic search for literature on anxiety associated with information related tasks yielded a total of 1,609 citations. Of these citations, 340 citations were considered relevant after an initial

scanning of titles and abstracts. The full-text of these citations were downloaded and scanned to identify the relevant studies meeting eligibility criterion resulting in a total of 85 studies that had used self-rating scales having the potential to measure different types of anxiety associated with information related tasks such as library anxiety, information seeking anxiety, and information anxiety. Fifty studies reported internal reliability coefficient Cronbach alpha while 15 reported validity. There were only five studies that reported external reliability such as test-retest. The studies reporting reliability and validity were used for further analysis. Table 3 outlined the characteristics of 85 studies using self-rating scales measuring anxiety associated with information related tasks. The year of publication of these studies ranged between 1992 and 2019. A large majority of these research studies were published in the journals of library and information science. Several studies were in the journal of other fields (e.g. psychology, management, etc.). These studies were conducted in different geographical locales (i.e. USA, UK, Europe, Canada, Kuwait, Malaysia, China, Pakistan, Bangladesh, India, West Indies, etc.) in the academic contexts especially universities and colleges using students of different fields. There were only a few studies that were conducted in the workplace context. The sample size in the 85 studies ranged from 15 to 1,389.

RQ2: Scale assessing anxiety associated with information related tasks

A total of 85 eligible studies reported information on nine different self-rating scales. Table 3 presents details of these instruments. The number of items in various scales ranged from five to 55 which needs to be measured on Likert or Likert-type scoring methods. The titles of these nine scales are also mentioned in this table. Library Anxiety Scale (LAS) developed by Bostick (1992) in the USA appeared to be the widely used measure to measure library anxiety. It was used in 54 studies using college and university students, out of which some were conducted in other countries. This scale was developed using college and university students of all levels from first-year to post-graduate in two phases and had 43 items structured into five sub-dimensions namely, staff barriers, affective barriers, comfort with the library, barriers with library knowledge, and mechanical barriers. It was found a highly reliable and of reasonable length. It also had a few translations and modifications owing to varying educational, cultural, and geographical environments (Anwar, Al-Kandari and Al-Qallaf 2004; Shoham and Mizrachi 2004; Swigon 2011; Van Kampen 2004). Some scholars reported LAS as superannuated and inadequate for its continued application to measure library anxiety in the digital environment (Anwar et al., 2004; Kwon, 2004).

Based on Bostick's LAS, some other scales were developed. For example, Van Kampen (2004) developed a Multidimensional Library Anxiety Scale (MLAS) for doctoral students. MLAS had 54-items structured into six dimensions, namely, comfort and confidence when using the library, information seeking process anxiety, staff barriers, perceived importance of the library, library technologies competence, and comfort level while inside the library building. MLAS has been used in five studies since its development. Lambert and Blundell (2014) developed an information anxiety scale based on LAS along with 12 additional items related to

information technology anxiety. They combined library anxiety and ICT anxiety and called it information anxiety despite the unsuitability of Bostick's LAS in the contemporary information landscape as reported by Anwar et al. (2004) and Kwon (2004). It is worth noting here that the reliability and validity of this instrument has not been reported so far. Three other scales such as P-LAS, C-LAS, and G-LAS were developed based on the statements from Bostick's LAS and Van Kampen's MLAS. Świgoń (2011) developed P-LAS in Poland which had 46-items divided into six dimensions, namely, barriers with staff, affective, technology, library knowledge, library comfort, and resource. The P-LAS was used only in a single survey in India. C-LAS was developed by Song et al. (2014) in China based on 12 statements from Bostick's LAS and 10 items from Van Kampen's MLAS along with 16 new items generated from interviews, with a total of 38 items divided into seven factors as knowledge, regulations, staff, affection, retrieval, comfort, and resources. G-LAS was developed in Greece by Doris et al. (2017) based on statements from LAS and MLAS which was clustered into 8 constructs, namely, barriers with staff, affective, technology, library knowledge, organization, library services knowledge, library comfort, resources, and rules. C-LAS and G-LAS do not appear to have been used by any study so far.

The second most used instrument was the "Information Seeking Anxiety Scale (ISAS)" developed by Erfanmanesh, et al. (2012) in Malaysia considering the contemporary digital environment for postgraduate students. ISAS comprised of 47 statements divided into six sub-dimensions, namely, barriers with information resources, computer and internet barriers, barriers associated with the library, barriers with searching for information, technical barriers, and topic identification barriers. It has been used in nine surveys conducted in Malaysia, Pakistan, and Iran. ISAS appears to be the only reliable scale measuring information seeking anxiety among postgraduate students.

The third widely used scale was AQAK developed for undergraduate students by Anwar, Al-Qallaf, Al-Kandari, and Al-Ansari (2012) considering the age and unsuitability of Bostick's LAS in a drastically changed library environment. AQAK comprised of 40-items divided into five sub-dimensions, namely, information resources, library staff, user knowledge, library environment, and User education. This scale was reported as a highly reliable and valid library anxiety scale indicating both internal and external reliability. It is worth mentioning here that AQAK identified 'User education', for the first time, as a factor in library anxiety indicating the future directions for information literacy instruction. Since its development, AQAK has been used in five studies.

There was one more scale assessing information anxiety developed by Girard (2005) based on Wurman's information anxiety framework. This scale comprised of 5-items covering areas, namely, understanding information, information overload, knowing information exists, finding information, and accessing information. It has been used in three surveys in the workplace context using civil-military servants and managers in the USA and Canada.

Table 3
 Characteristics of scales used in the systematic review

Scale	Background	Construct Assessed	Studies Reporting Use	Sample	Type of Reliability	Type of validity
LAS (Bostick, 1992)	Original; Developed for all levels of college and university students; grouped into five sub-dimensions namely, staff barriers, affective barriers, comfort with the library, barriers with library knowledge, and mechanical barriers.	Library anxiety (43-items)	Onwuegbuzie (1997); Gross & Latham (2007); Jiao, Onwuegbuzie & Lichtenstein (1996); Weems & Onwuegbuzie (2001); Onwuegbuzie & Jiao (2000); Jiao & Onwuegbuzie (1998); Jiao & Onwuegbuzie (1997); Kwon (2008); Van Scoyoc (2003); Anwar, Al-Kandari & Al-Qallaf (2004); Jiao & Onwuegbuzie (1999a); Shoham & Mizarchi (2001); Mizarchi & Shoham (2004); Onwuegbuzie, & Jiao (1998a); Onwuegbuzie and Jiao (2004); Jerabek, Meyer, & Kordinak (2001); Jiao & Onwuegbuzie (1999b); Onwuegbuzie & Jiao (1997); Kwon, Onwuegbuzie & Alexander (2007); Onwuegbuzie (1999); Jiao & Onwuegbuzie (2002); Jiao & Onwuegbuzie (2001); Jiao, Onwuegbuzie & Waytowich (2008); Collins & Veal (2004); Goebel Brown, Weingart, Johnson, & Dance (2004); Jiao, Onwuegbuzie & Bostick (2006); Onwuegbuzie & Jiao (1998); Jiao, Onwuegbuzie & Bostick (2004); Lawless (2011); Still (2015); Onwuegbuzie, Jiao, & Daley (1997); Brannan (2003); Nicholas, Rudowsky, & Valencia (n. d.); Fraser & Bartlett (2018); Gross &	69 undergraduate college students-USA; 81 graduate students-USA; 58 students-USA; 493 university students-USA; 522 students-USA; 135 graduate students-USA; 108 graduate students-USA; 522 graduate and undergraduate students-USA; 137 university undergraduates-USA; 238 students; 145 undergraduates-Kuwait; 148 graduate students-USA; 664 College students-Israel; 664 College students-Israel; 203 graduate students; 225 graduates-USA; 241 undergraduates-USA; 115 graduates-USA; 522 students-USA; 170 graduates-USA; 203 graduates-USA; 115 graduates-USA; 133 graduates-USA; 93 Doctoral students-USA; 143 off-campus adult learners-USA; 936 and 816 freshmen (pretest & posttest); 180 graduates-USA; 203 graduates-USA; 180 graduates-USA; 162 university students-Canada; 36 student nursing students; 522 university students; 23 university students-USA; 74 university students; 48 undergraduates and graduates-Scotland; 51 university students; 110 postgraduates-India; 161 first year university students-USA; 57 university students-Turkey;	Internal consistency using Cronbach's α : 0.80; 0.71-0.88; .92; .92; .65-.94; .60-.90; 0.60-.91; .94; .70-.90; .64-.92; 0.45- 0.77; 0.68-0.93; 0.60-0.90; 0.53-0.90; 0.68-0.93; 0.95; 0.69-0.90; 0.62- 0.94; 0.51-0.93; 0.56-0.91; 0.91; 0.94; 0.69; 0.83; 0.95; 0.92; 0.95; 0.65-0.94; 0.86; 0.72-0.89; 0.89; 0.77-0.91 Test-retest coefficient: 0.74	Face and content validity through experts; Construct validity through EFA with varimax rotation; Convergent validity ranged from 0.62-0.93.; Construct validity through CFA

Table continued...

Scale	Background	Construct Assessed	Studies Reporting Use	Sample	Type of Reliability	Type of validity
			Latham. (n.d.); Mangkhollen, Firdaus & Thiyagarajan (2015); Parks (2019); Demir, Güneş & Çakmakkaya (2018); Anjaline & Saravanan (2017a); Sinnasamy & Amin (2015); Karim & Ansari (2013); Cleveland (2001); Biglu Ghavami & Dadashpour (2016); Ahmed & Aziz (2017); Veal (2002); Lu & Adkins (2013); Blundell & Lambert (2014); McPherson (2015); Jiao & Onwuegbuzie (2000); Jiao & Onwuegbuzie (1999); Sinnasamy & Karim (2017); Farhadpoor (2016); Karim & Ab Rashid (2016); Janaki & Karim (2014); Karim & Shamsuddin (2014)	306 college undergraduate students-India; 102 postgraduate students-Malaysia; 367 undergraduates-Malaysia; 297 college students; 580 medical students-Iran; 350 university students-Bangladesh; 143 adult learners-USA; 15 international graduates-USA; 125 college freshmen-USA; 150 undergraduates-West Indies; 133 graduate students-USA; 135 graduates-USA; 438 final year students-Malaysia; 370 public library users-Iran; 130 medical students-Malaysia; 114 University students-Malaysia; 104 undergraduate medical students-Malaysia		
MLAS (Van Kampen, 2004)	Developed based on LAS for doctoral students; has 6 dimensions as comfort with library, ISP and library anxiety, staff barriers, understanding of library use, comfort with technology, and comfort with the library while being inside	Library anxiety and Info Search Process (54-items)	Grandy (2019); Bowers (2010); Platt & Platt (2013); Erfanmanesh (2011)	278 doctoral students-USA; 30 adult learners-USA; 147 law students-USA; 57 psychology undergraduate students-USA; 123 students-Iran	Internal consistency using Cronbach's α : 0.88, 0.91; Test-retest	Content validity through experts and pilot testing; Construct validity through EFA with varimax rotation; CFA
P-LAS (Świgoń, 2011)	Developed based on LAS and MLAS; Comprised of 6-components such as barriers with staff, affective, technology, library knowledge, library comfort, and resource	Library anxiety (46-items)	Anjaline & Saravanan (2017b)	70 individuals from two universities-Poland; 200 undergraduate students from Colleges-Tamilnadu-India	Internal consistency using Cronbach's α : 0.91	Construct validity through EFA

Scale	Background	Construct Assessed	Studies Reporting Use	Sample	Type of Reliability	Type of validity
C-LAS (Song et al. (2014).	Developed based on 12 statements from LAS and 10 items from MLAS along 16 new items generated from interviews; Comprised of 7-factors as knowledge, regulations, staff, affection, retrieval, comfort, and resources	Library anxiety (38-items)	None	1389 university students-China	Internal consistency using Cronbach's α : 0.842; Test-retest reliability	Content validity through experts; Construct validity through EFA
G-LAS (Doris, et al 2017)	Developed based on LAS and MLAS; clustered into 8 constructs as barriers with staff, affective, technology, library knowledge, organization, library services knowledge, library comfort, resources, and rules.	Library anxiety (32-items)	None	279 undergraduate students-Greece	Internal consistency using Cronbach's α : 0.93	Content validity through pre-testing; Convergent validity through CFA; Discriminant validity through AVE
AQAK (Anwar et al, 2012)	Original; Developed for undergraduate students considering the unsuitability of LAS for modern library environment; clustered into 5 factors, namely, library resources, library staff, user knowledge, library environment, and user education.	Library anxiety (40-items)	Rehman, Soroya & Awan (2015); Jan, Anwar & Warraich (2016a); Jan, Anwar & Warraich (2016b); Jan & Anwar (2017); Jan, Anwar & Warraich (2018)	687 undergraduate students-Kuwait; 725 undergraduates-Pakistan; 279 social sciences undergraduates-Pakistan; 281 agriculture undergraduates-Pakistan (one dimension "barriers with staff" was used); 725 undergraduates-Pakistan; 550 undergraduates-Pakistan	Internal consistency using Cronbach's α : 0.904; 0.82; 0.82; 0.67; 0.82; Test-retest coefficient: 0.84	Face and content validity by experts; Construct validity with EFA and varimax rotation

Table continued...

Scale	Background	Construct Assessed	Studies Reporting Use	Sample	Type of Reliability	Type of validity
ISAS (Erfanmanesh, et al 2012)	Original; Developed for postgraduates considering the digital environment including library, web, and human; Clustered into 6 sub-scales as barriers associated with information resources, computer and internet, library, searching, technology, and topic identification.	Info seeking anxiety (47-items)	Erfanmanesh, Abrizah, & Karim (2014); Rahimi & Bayat (2015); Aghaei, Soleymani & Rizi, (2017); Naveed & Amin (2017a; 2017b); Naveed & Amin (2016a; 2016b; 2016c); Erfanmanesh (2016)	400 postgraduate students-Malaysia; 265 postgraduate medical students-Iran; 251 postgraduate students-Pakistan; 375 postgraduates-Malaysia;	Internal consistency using Cronbach's α : 0.902, 0.906, 0.94; 0.917	Construct validity with EFA and varimax rotation; Face and content validity by experts
IAS (Girard, 2005)	Original; Developed based on Wurman's framework; 5-dimensions, namely, understanding information, information overload, knowing information exists, finding information, and accessing information.	Info anxiety (5-items)	Allison (2006); Ojo (2016). Allison (2008)	99 public service middle managers-Canada; Air Force military personnel-USA; Air Force Officer-USA; 193 undergraduate students from two universities-Nigeria	Internal consistency using Cronbach's α : 0.759	Face and content validity by experts
IAS (Blundell & Lambert, 2014)	Developed based on LAS along with 12 additional items related to information technology anxiety	Info anxiety (55-items)	None	96 undergraduate students-USA	Not any	Not any

RQ3: Evidence of reliability and validity

Table 3 indicated the reliability measures used in the studies included in this systematic review. These figures revealed that the internal consistency was calculated for all self-rating anxiety scales except the information anxiety scale developed by Lambert and Blundell (2014). Internal reliability was calculated repeatedly in many cases and sometimes it was assessed only for sub-dimensions. Of the total 50 values of the internal reliability coefficient, that is, Cronbach's alpha, the range was between 0.45 and 0.94. In most of the cases, the value of alpha was greater than 0.90. The external reliability, that is, test-retest, was assessed only for four scales. Two studies did not report the values of correlation for the coefficient Pearson r. However, the studies reported these values which ranged from 0.74 to 0.84 that were found to be statistically significant.

The evidence of validity was reported for all scales except the information anxiety scale developed by Lambert and Blundell (2014). The information anxiety scale developed by Girard (2005) reported content validity only. The rest of the scales not only reported face and content validity of these scales but also construct validity either through exploratory factor analysis (EFA) or through confirmatory factor analysis (CFA) as it is another method of assessing validity. There were only three scales for which CFA was reported. G-LAS by Doris, et al (2017) is the only scale which reports convergent and discriminant validity. However, it is worth noting that there is a small number of studies investigating psychometric properties in cross-cultural environments. Some studies did not report the nature of experts for validation of the face and content of the instrument. Concurrent and predictive validity was not reported for any of the scales included in this systematic review.

Discussion

This systematic review indicated that the measurement of anxiety associated with information related tasks is and has been an active research area that captured the interest of information professionals such as librarians, academicians, and researchers. However, there was an alarming situation towards the use of quality measures in the design of scales and using these scales to measure information related anxiety among different populations as most of these studies reported assessment surveys without a description of any reliability and validity of instruments they used. There was only a limited number of studies that covered cross-cultural psychometric properties of these scales. The reasons for not reporting such important information in these studies might include the authors' lack of awareness about the scale development process, lack of realization about the significance of reporting psychometric properties, and weaker results towards reliability and validity of the used instruments (Mahmood, 2017). These results appeared to be in line with systematic reviews of other research areas such as continuing medical education (Ratanawongsa et al., 2008), urbanicity (Cyril et al., 2013), communication skills (Setyonugroho et al., 2015), and information literacy (Mahmood, 2017) as most of the

assessment studies in the above-mentioned research areas did not report information on reliability and validity.

The present study identified nine scales fulfilling psychometric requirements to measure people's anxiety associated with information related tasks. Bostick's LAS (1992) was among the top most used scales developed in the USA. It was designed to measure library anxiety for college and university students and was widely used in the USA and some other countries. It also had several modifications and translations due to cultural and geographical reasons. However, some researchers reported it as an outdated and unsuitable in the contemporary digital environment that had drastically changed in the last two decades (e.g. (Anwar et al., 2004; Kwon, 2004). Another library anxiety scale, namely, AQAK by Anwar et al (2012) was designed especially for undergraduate students considering the digital information landscape and unsuitability of Bostick's LAS in the contemporary information environment. AQAK, developed using undergraduate students from Kuwait, has been used by five studies to measure library anxiety among undergraduate students. The scope of AQAK is broader than Bostick's LAS because AQAK goes beyond the four falls of the library in measuring library anxiety. It is worth mentioning here that AQAK is different from Bostick's LAS, Van Kampen's MLAS, and modified and translated versions of Bostick's LAS. It is the only scale that identifies for the first time 'user education' as the construct of library anxiety. No studies appear to have investigated the psychometric properties of AQAK since its development indicating the need for more investigations for its cross-cultural evaluations.

Another frequently used scale was Information Seeking Anxiety Scale (ISAS) developed by Erfanmanesh et al. (2012) which emerged from Malaysia. ISAS was specifically designed to measure information seeking anxiety among postgraduate students. This scale has been used in nine studies from Iran, Malaysia, and Pakistan. A cross-cultural evaluation of the psychometric properties of ISAS by Naveed and Ameen (2017b) indicated that it is a reliable and valid scale that measures information seeking anxiety. The scope of ISAS is broader than library anxiety as it measures anxiety while seeking information not only in a library setting but also from other sources such as the internet, and human. However, the researchers suggested the need for more inquires evaluating it in cross-cultural environments. A scale measuring information anxiety (IAS) was developed by Girard (2005) based on Wurman's (1989) information anxiety framework. IAS has been used by a few studies in the workplace context using civil-military servants and managers in the USA and Canada. None of these studies reported its psychometric properties.

It was interesting to note that there were three main constructs, library anxiety, information seeking anxiety, and information anxiety that were found to be associated with people's anxiety in information-related tasks. These three distinct but related concepts were explained by Naveed and Anwar (2019) with the help of a nested model of information anxiety. The nested model represented information anxiety as the general and broader concept nesting information seeking anxiety as its sub-set and library anxiety as a further sub-set. In other words,

library anxiety is a subset of information seeking anxiety and that information seeking anxiety, in turn, is a subset of information anxiety. The nested model did not reflect, in any way, the amount of research output through the scope of each concept presented. It is worth mentioning here that the research output on each concept, at present, was reversed in order of scope of these concepts – the narrower the scope of the concept, the greater the amount of research output. The phenomenon of library anxiety and information seeking anxiety was measured in academic settings using students of different levels. However, the phenomenon of information anxiety was assessed in the workplace context by a few studies only.

This review revealed that the internal reliability coefficient, Cronbach's alpha, was the most reported measure of reliability as it was "a function of the number of test items and the average inter-correlation among the items" (Mahmood, 2017, p. 1046). The value of alpha closer to one indicates higher reliability but the test does not mean it is unidimensional. Many researchers present high value of the internal reliability coefficient (Cronbach alpha) for the representation of their scale as unidimensional which is misleading. Although internal consistency can be assessed using alpha but only when factor analysis has been carried out. The alpha must be calculated for each factor if the factor analysis yields multiple factors. This measure of reliability is the most popular and widely used in social and behavioral sciences as reported by similar reviews of other subjects (Cyril et al., 2013; Mahmood, 2017; Nolan et al., 2012; Ratanawongsa et al., 2008). Most of the alpha values that appeared in the studies included in this review showed a high level of internal consistency except some of the cases with an alpha value of less than 0.60 which is unacceptable (DeVellis, 2012; Salazar et al., 2015). The length of the test affected the alpha value as a short test usually has a reduced alpha value. Tavakol and Dennick (2011) argued that alpha value is not permanent as it is a property of the specific sample scores on a given test. Hence, the researcher should calculate alpha each time the scale items are distributed for data collection. The other method of reliability that several studies under review reported was test-retest. Test-retest is a measure of external reliability which is estimated through calculations of the correlation between two sets of scores obtained from the same sample by administering the measure on two occasions (Anwar et al., 2012). This method of reliability is also very important declaring a scale as useful. No other method of reliability was found in this systematic review. The non-utilization of other methods of reliability might be due to lack of familiarity, lack of advanced level training in psychometrics of scale developers and users for assessment of information related anxieties.

As far as validity is concerned, face and content validity were the most common and highly recommended methods that were used for the development of new scales as it was reported for seven scales. Besides, construct validity through exploratory factor analysis (EFA) was assessed only by five scales whereas the construct validity through confirmatory factor analysis (CFA) was used for only three scales. The construct validity of new scales was assessed through EFA. If the existing scales are used for data collection with a new sample, the construct validity needs to be assessed through CFA. Discriminant and convergent validity were assessed

only for a single scale and case (Doris, et al. 2017). Most of these studies did not investigate the psychometric properties of the scales they employed for measuring anxiety associated with information related tasks. The reasons for this once again might be due to the lack of familiarity and expertise of researchers and practitioners investigating the proposed area of research. Despite these limitations, these scales have been widely used without assessing their reliability and validity. The use of these scales measuring anxiety associated with information related tasks can only be justified through optimal psychometric properties. The alleviation of library users' information related anxieties can only be achieved through need-based information literacy instructions but adequate and credible information anxiety assessment is always significant for this purpose.

Conclusions and Limitations

This review generated useful insights by summarizing and appraising the psychometrics and quality of scales measuring information related anxieties that had implications for research and practice. The results spotlighted the strengths and weaknesses of surveys measuring information related anxieties reported in the existing empirical research. This review revealed that the existing empirical research on this area employed mainly classical psychometric methods. None of the existing studies utilized the Rasch model for psychometric analysis— a comparatively new technique for psychometric evaluations having several advantages over classical psychometric theory. Furthermore, all the existing scales were self-rating rather than actual. People might underestimate their levels of information anxiety in self-reporting or may hide their feeling due to shyness or inferiority complex as compared to actual information anxiety. Therefore, an alternative mechanism should be considered for information anxiety assessment in collaboration with psychologists or psychiatrists. If an assessment instrument did not measure accurately and specifically the levels of anxiety associated with information related tasks, no intervention might be appropriately planned for the alleviation of anxiety among information seekers. Therefore, the existing scales demonstrating reliability in existing research should be tested again and again in populations belonging to different geographical locales and cultures as reliability is always sample-specific that is 'affected by both the variance in true scores within a population as well as the variance in measured scores' (Mahmood, 2017, p. 1047).

Considering the importance of acceptable reliability and validity measures for data collection instruments, the statisticians need to be consulted by information professionals and researchers either for getting training in methods of scale development, psychometric evaluations and reporting information on reliability and validity through standardized methods or for collaboration in getting assistance in the projects so that credible research results might be achieved. In addition, the journal referees and editors also need to ensure the reliability and validity of data collection instruments before finalizing the manuscripts for publications. The reviewers and editors should question the lack of information about the reliability and validity of data collection instruments in research papers for the promotion of using good quality scales in

empirical research. A specialized course for applied statistics in social sciences research might also be included in the curriculum by academicians associated with information education. These results might be useful for practitioners, researchers, and policymakers. In limitations, this review was limited to research reported in the English language. Therefore, there might be good scales having the potential to measure information anxiety which were published in other languages but not indexed in the sources used by this study.

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