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Evaluating the psychometric soundness of Bostick's library anxiety scale among medical students in a Malaysian public university

Noor Harun Abdul Karim[1] **& Nik Nur Asilah Nik Shamsuddin**[2]
[1]Department of Library and Information Science, Faculty of Computer Science and Information Technology, University of Malaya, Kuala Lumpur, Malaysia
[2]University of Malaya Library, University of Malaya, Kuala Lumpur, Malaysia
e-mail: nharun@um.edu.my; nnans@um.edu.my

ABSTRACT
The study was about exploring the phenomenon of library anxiety among medical students and examines various antecedents that may contribute towards increasing or decreasing level of library anxiety. Bostick's (1992) Library Anxiety Scale has been widely used to assess library anxiety among library users. The instrument was pre-tested and the reliability and validity of the scale was established. The 46-item modified version of Bostick's (1992) Library Anxiety Scale was tested among 104 students from a population of 354 undergraduate students. The instruments were administered during information skills sessions by copies handed directly to students. A 100% return rate was achieved in which the questionnaires that were returned were found usable. The findings revealed a 4-factor solution which corresponded to the five factors as found by Bostick's (1992) pioneering psychometric effort on library anxiety. The study sub-scales of library anxiety were named as: Staff Barriers, Affective Barriers, Barriers with Library Technology, and Cognitive Barriers. The factor "Staff Barriers" explained the greatest proportion of variance to be at 19.12% in the library anxiety construct. The overall scale as well as each of the four sub-scales was submitted to an internal reliability assessment using Cronbach's internal reliability coefficient alpha. All four sub-scales found to have satisfied the 0.70 criteria as recommended by Nunnally and Bernstein (1994). This finding was found to be consistent with the previous studies that found the scale to be valid as well as internally reliable.

Keywords: Bostick's library anxiety scale; Library anxiety; Medical students; Construct validity; Internal reliability

INTRODUCTION

Anxiety is defined as a "mood or state characterized by apprehension and somatic symptoms of tension in which an individual anticipates impending danger, catastrophe, or misfortune" (VandenBos, 2007). The term 'library anxiety' is generally used to describe the negative feelings experienced by many college students towards using the academic library (Lu & Adkins, 2012). The transition from high school to college/university can be incredibly exciting and at the same time, terrifying for first-

year college/university students. Moving into unfamiliar surroundings, making new friends, and living on their own can be an overwhelming experience. Along with these new lifestyle changes, college/university classes and coursework also contribute to even more anxiety. The problems arise because most of the students have never been to the college/university library. The students often have absolutely no idea what to do once they are in the library and they are afraid, of making a complete idiot of themselves.

Knowing the importance of information is one thing, but knowing where and how to find it efficiently is even more important. In helping to build students' research skills, librarians have a valuable role to play. The librarians can assist students with searching additional information sources on virtually any topic, and in general they can help them find sources more quickly and easily. For decades, librarians have observed that students often feel more uncomfortable while utilizing libraries. Indeed, the idea that students vary in their levels of apprehension experienced when using academic libraries is not new. Yet, it is only recently that formal investigations have been undertaken on the nature, etiology, characteristics, and consequences of this phenomenon (Jiao and Onwuegbuzie, 1999). The studies showed that freshmen exhibited the highest level of anxiety. Based on this research, librarians should learn how to recognize the fear characteristics and know how to alleviate them by providing the appropriate anxiety-reducing interventions.

Mellon (1986) was the first person to recognize library anxiety as a real phenomenon. She started out examining library instruction and its helpfulness, and then she found that students experience fear when beginning their research than with specific problems when conducting their research. She also discovered that students were overwhelmed by the size of the library, did not know where to begin their research, and did not know how to proceed once they began. She thought that library instruction should be expanded to provide comfort and ease, rather than trying to teach the specifics of research too quickly.

Bostick (1992) created the Library Anxiety Scale (LAS) as there was no scale to measure Mellon's theory at that time. Bostick (1992) in validating and testing the Library Anxiety Scale found that the dimensions of library anxiety could be summarized into five categories: barriers with staff (perceptions that librarians and staff are unapproachable or preoccupied); affective barriers (stemming from a belief that the student holds inadequate skills); comfort with the library technology (concerning the general safety and welcoming nature of library space); knowledge of the library (familiarity with the layout and policies); and mechanical barriers (ability to use and operational conditions of various mechanical equipment).

"Barriers with staff" refer to the perceptions students have that librarians are intimidating and unapproachable. The librarian is also perceived as being too busy to provide assistance in using the library (Jiao and Onwuegbuzie, 1997). A high score on this sub-scale or dimension will indicate higher levels of library anxiety. "Affective barriers" refer to students' feelings of inadequacy when using the library. These feelings of ineptness are heightened by the assumption that they alone possess incompetent library skills (Jiao and Onweugbuzie, 1997) and to make matters worse, they feel that the place is full of fellow students who all appear to know what they are doing. A high

score on this sub-scale will indicate greater levels of library anxiety. "Comfort with the library technology" refers to the students' reactions to the ambience of the library and how safe, welcoming, and non-threatening the library is perceived by them (Jiao & Onwuegbuzie, 1999a, Jiao, Onwuegbuzie & Lichtenstein, 1996). A high score on this sub-scale will indicate lesser levels of library anxiety whereas lower scores will indicate greater levels of library anxiety. "Knowledge of the library" refers to how sharp students think they are with the library. A lack of familiarity leads to frustration, anxiety, and subsequently, further avoidance behaviours (Jiao and Onwuegbuzie, 1997). A high score on this sub-scale will indicate low anxiety whereas a low score will indicate higher levels of library anxiety. "Mechanical barriers" refers with the students' reliance on mechanical library equipment including change machines, computer printers an others (Jiao & Onwuegbuzie, 1999a). A high score on this sub-scale will indicate higher levels of library anxiety.

While a number of studies were conducted to validate the Library Anxiety Scale (LAS), little is known about library anxiety among students of a particular field such as medicine, dentistry, law and others. Novera (2008) was the first person who explored the phenomenon of library anxiety among undergraduates in the Malaysian academic library setting. Building on this, the current study investigated the phenomenon of library anxiety among medical undergraduate students using a modified version of Bostick's (1992) Library Anxiety Scale (LAS).

LITERATURE REVIEW

Bostick

Bostick (1992) developed and validated the Library Anxiety Scale. This 43-item 5-point Likert-format instrument has five dimensions namely, barriers with staff, (alpha = 0.90); affective barriers, (alpha = 0.80); comfort with the library, (alpha = 0.66); knowledge of the library, (alpha = 0.62); and mechanical barriers, (alpha = 0.60). These factors collectively explained 51.8% of the variation in library anxiety. Further, the internal reliability assessment using Cronbach's internal reliability coefficient alpha was reported to be at 0.80 for the overall scale. A test-retest further confirmed the overall scale to be internally reliable at 0.74. This instrument has been utilized extensively in a number of library anxiety studies (Noor and Ansari, 2010).

Shoham and Mizrachi

Shoham and Mizrachi (2001) investigated the library anxiety phenomenon among undergraduate students in Israel. They however employed a modified Hebrew version of Bostick's (1992) which was referred to as the H-LAS. The H-LAS is a 35-item library anxiety scale which when tested for construct validity using exploratory factor analysis resulted in a seven factor solution with the following sub-scales: staff factor, knowledge factor, language factor, physical comfort factor, library computer comfort factor, library policies/hours factor and resource factor. They did not provide information about the percentage of total variance explained by all the factors. The sub-scales when examined for internal reliability estimates were found to have the following alpha reliability

coefficients: staff factor, 0.75; knowledge factor, 0.76; language factor, 0.76; physical comfort factor, 0.60; library computer comfort, 0.51; library policies/hours factor, 0.45; and resource factor, 0.52.

Van Kampen

Van Kampen (2003) developed a multi-dimensional 53-item instrument to measure library anxiety. The instrument was administered to 554 doctoral students at an urban university in southeastern United States of America. Results of running an exploratory factor analysis yielded six factors which collectively explained 43.39% of the variance. Furthermore, the six factors were found to have the following Cronbach's alpha reliability coefficients: barriers with staff, 0.73; comfort and confidence when using the library, 0.86; comfort level while inside the library building, 0.74; comfort level with technology as it applies to the library, 0.73; importance of understanding how to use the library, 0.79; information search process and general library anxiety, 0.87

Anwar, Al-Kandari and Al-Qallaf

Anwar, Al-Kandari and Al-Qallaf (2004) investigated the library anxiety phenomenon among 145 undergraduate biological sciences students in Kuwait. The 34-item instrument was based on the Library Anxiety Scale developed by Bostick (1992). Exploratory factor analysis was used to determine the appropriate number of factors and statement groupings in each of these factors. The factor analysis yielded four factors which explained 47% of the total variance. The four factors were found to have the following Cronbach's alpha reliability coefficients: Staff approachability, 0.9082; Feelings of inadequacy, 0.7856; Library confidence, 0.7806; Library constraints, 0.7078.

Noor and Ansari

Noor and Ansari (2010) administered a 49-item modified version of Bostick's (1992) Library Anxiety Scale to 367 undergraduate students in a Malaysian institution of higher learning. The instruments were administered during classroom hours using a self reported questionnaire. This study attempted to evaluate the scale's psychometric soundness and stability among a population whose native language is not English. Results of running an exploratory factor analysis yielded five factors which collectively explained 39.56% of the variance. The sub-scales when examined for internal reliability estimates were found to have the following alpha reliability coefficients: barriers with staff, 0.91; comfort with library services, 0.73; affective barriers, 0.70; cognitive barriers, 0.81; and comfort with library technology, 0.68.

Swigon

Swigon (2011) developed the Polish Library Anxiety Scale (P-LAS) which based on Bostick's (1992) Library Anxiety Scale (LAS) and three other scales: Multidimensional LAS (MLAS), Hebrew-LAS (H-LAS), and Kuwait-LAS (KLAS). The instrument was administered to 100 participants comprising bachelor's level students, master's level students, doctoral level students, and faculty members at three Polish universities were studied. This 46-item library anxiety scale which when tested for construct validity using

exploratory factor analysis resulted in a six factor solution with the following sub-scales: barriers with staff (alpha = 0.75); affective barriers(alpha = 0.80); technological barriers (alpha = 0.73); library knowledge barriers (alpha = 0.78); library comfort barriers (alpha = 0.47) and resources barriers (alpha = 0.75).

RESEARCH QUESTIONS

a) Are the sub-scales of Bostick's Library Anxiety Instrument distinguishable from one another ie. do the measure exhibit convergent as well as discriminate validity what applied among medical undergraduates?
b) Is each of the sub-scales internally reliable what applied among medical undergraduates?

RESEARCH DESIGN

Methods and Instruments

For the purpose of this research, a self-reported questionnaire was designed to obtain quantitative data from the respondents. The questionnaire was divided into three sections. The demographic data was requested in the first section which includes items on gender, nationality, native language and year of study. The second section elicits information on frequency of library visit, physical distance from the library, previous library experience, and prior medium of library instruction. The third section elicits information with regards to the library anxiety construct using a modified version of Bostick's (1992) Library Anxiety Scale. This scale consists of 46 items, anchored on a five-point Likert Scale ranging from 1 (strongly disagree) to 5 (strongly agree). The scale comprise positively as well as negatively worded items which are reversed scored to ensure high scores on each of the 46-item instrument to represent high level of library anxiety whilst low scores would represent lower level of library anxiety.

Population and Sampling Process

The target population for this study was medical undergraduate students at the Faculty of Medicine, University of Malaya. The sampling processes started by getting the target population size of 354 undergraduate medical students enrolled for Semester I 2010/2011. After allowing for plus-minus five percent error rate, 104 students were proportionately selected to participate in the study. The participants were randomly selected using a table of computer generated random numbers by employing the Statistical Product and Service Solution software (SPSS). Luckily, a 100% response rate was achieved resulting in 104 fully completed usable questionnaires.

RESULTS

Factor Analysis

(a) Construct Validation of Bostick's Library Anxiety Scale

To assess the construct validity of the modified version of Bostick's (1992) Library Anxiety Scale, a principal component exploratory factor analysis was employed on the 46-item instrument. Using a varimax rotation and factor loading coefficient of 0.40 or greater as a criterion for deeming a factor loading as practically significant yielded a 13-factor solutions (eigenvalues more than 1.00) that collectively explained 69.4% of the variance in the library anxiety construct.

Out of the 46 items that were submitted to a principal component analysis, only 42 items were found to have factor loading coefficients that met the 0.40 criterion. The results of running a principal component analysis revealed that the majority of the items were loaded on Factor 1 (10 items), Factor 2 (7 items) and Factor 5 (4 items). The remaining factors had only between 2 to 3 items subsumed under each one of them.

The findings were difficult to interpret and as a result, a second run of the principal component analysis was performed on the 42 items that were derived from the first run of the principal component analysis. To achieve a more meaningful interpretation of the findings, the items were forced into 5 factors. This resulted in a 5-factor solution that explained 54.5% of the variance in the library anxiety construct. This second run of the principal component analysis factor reduced the number of items from 42 to 38. Despite the reduction in the number of factors and items, a meaningful interpretation of the five factors was still difficult to achieve.

Consequently, a third run of principal component analysis was performed on the 38 items derived from the previous run. In the third run, the items were forced into 4 factors. This resulted in a 4-factor solution which explained 47.9% of the variance in the library anxiety construct. The findings revealed that the number of items was now reduced from 38 to 31. The findings showed that factor 1 has 11 items loaded on it, factor 2 has 9 items loaded on it, and factor 3 has 6 items whereas factor 4 has only 5 items loaded on it. The final run of the principal component analysis resulted in a more meaningful interpretation of the item underlying each of the four factors. Table 1 describes the factors, the items loaded on it, their eigenvalues as well as the percent of variance explained by each of the four factors.

Table 1: Descriptions of Four Factors Derived from the Third Run of Principal Component Analysis

Factor Description	No. of Items	Eigenvalue	Percent of Variance Explained
Barriers with staff	11	6.71	19.12
Affective barriers	10	4.01	11.45
Barriers with library technology	5	3.07	8.76
Cognitive barriers	4	3.00	8.56

(b) Internal Reliability Estimate of the Items Underlying the Four Factors

The first factor/component had 11 items underlying it. A detail examination of the 11 items showed that they were examining an underlying concept that can be labelled as "Barriers with staff". All the 11 items seem to indicate service providers as a source of a component or dimension of the library anxiety construct. Before a sub-scale called "Barriers with Staff" was computed, the 11 item component was submitted to an internal reliability assessment using Cronbach's internal reliability coefficient alpha. The results of running an internal reliability assessment test using Cronbach's alpha revealed the 11-item component to have yielded an alpha value of 0.91 which is above the recommended value of 0.70 as suggested by Nunnally (1978). The findings also showed that dropping any of the 11 items would not raise Cronbach's alpha value to anything higher than 0.91. Subsequently all the 11 items were averaged to compute a composite variable called "Barriers with Staff". This composite variable is a sub-scale of the overall library anxiety scale. The findings with regards to the internal reliability assessment for the 11- item component are shown in Table 2

Table 2: Barriers with Staff (Alpha=0.913)

Number	Scale Item	Factor Loadings
26	Librarians don't have time to help me	.900
5	Library staffs don't have time to help me	.898
7	The librarians don't have time to help me because they are always doing something else	.905
31	The library won't let me check out as many items as I need	.906
29	I don't know what resources are available in the library	.910
32	The staff doesn't care about students	.903
30	The library staff doesn't listen to students	.903
41	I don't need to use digital services for my research	.911
18	The librarians are unfriendly	.907
13	There is often no one available in the library to help me	.910
3	I can't get help in the library at the time I need it	.906

The second factor/component had 10 items underlying it. A detail examination of the 10 items showed that they were examining an underlying concept that can be labelled as "Affective Barriers". All the 10 items seem to indicate barriers with library staff as a source of a component or dimension of the library anxiety construct. Before a sub-scale called "Affective Barriers" was computed, the 10-item component was submitted to an internal reliability assessment using Cronbach's internal reliability coefficient alpha. The results of running an internal reliability assessment test using Cronbach's alpha revealed the 10-item component to have yielded an alpha value of 0.83 which is above the recommended value of 0.70 as suggested by Nunnally (1978). The finding also showed that dropping any of the 10 items would not raise Cronbach's alpha value to anything

higher than 0. 83. Subsequently, all the 10 items were averaged to compute a composite variable called "Affective Barriers". This composite variable is a sub-scale of the overall library anxiety scale. The findings with regard to the internal reliability assessment for the 10 item component are shown in Table 3.

Table 3: Affective Barriers (Alpha=0.834)

Number	Scale Item	Factor Loadings
10	I don't know what to do next when the book I need is not on the shelf	.833
14	I feel comfortable in the library	.808
2	The librarians are approachable	.807
6	The librarians don't have time to help me because they are always on the phone	.805
19	The library is a comfortable place to study	.826
1	I' m embarrassed that I don't know how to use the library	.816
32	I often can't find a place to study in the library	.814
4	The librarians are helpful	.826
45	I mostly use internet services in library to check my mail	.827
9	I get confused trying to find my way around the library	.821

The third factor/component had five items underlying it. A detail examination of the five items showed that they were examining an underlying concept that can be labelled as "Barriers with Library Technology". All the five items seem to indicate barriers with library technology as a source of component or dimension of the library anxiety construct. Before a sub-scale called "Barriers with Library Technology" was computed, the 5-item component was submitted to an internal reliability assessment using Cronbach's internal reliability coefficient alpha. The results of running an internal reliability assessment test using Cronbach's alpha revealed the 5-item component yielded an alpha value of 0.78 which is above the recommended value of 0.70 as suggested by Nunnally (1978). The findings also showed that dropping any of the five items would not raise Cronbach's alpha value to anything higher than 0.78. Subsequently all the five items were averaged to compute a composite variable called "Barriers with Library Technology". This composite variable is a sub-scale of the overall library anxiety scale. The findings with regards to the internal reliability assessment for the 5-item component are shown in Table 4.

Table 4: Barriers with Library Technology (Alpha=0.783)

Number	Scale Item	Factor Loadings
43	I often use digital services to browse theses/dissertation	.674
42	I often use digital services to browse the examination papers	.720
46	I frequently use self check out machine to borrow items from the library	.769
39	I don't know how to use digital services	.781
40	I never use digital services to find information	.757

The fourth factor/component had four items underlying it. A detail examination of the four items showed that they were examining an underlying concept that can be labelled as "Cognitive Barriers". All the four items seem to indicate cognitive barriers as a source of component or dimension of the library anxiety construct. Before a sub-scale called "Cognitive Barriers" was computed, the 4-item component was submitted to an internal reliability assessment using Cronbach's internal reliability coefficient alpha. The results of running an internal reliability assessment test using Cronbach's alpha revealed the 4-item component to have yielded an alpha value of 0.78 which is above the recommended value of 0.70 as suggested by Nunnally (1978). The findings also showed that dropping any of the four items would not raise Cronbach's alpha value to anything higher than 0.78. Subsequently all the four items were averaged to compute a composite variable called "Cognitive Barriers". This composite variable is a sub-scale of the overall library anxiety scale. The findings with regards to the internal reliability assessment for the 4-item component are shown in Table 5.

Table 5: Cognitive Barriers (Alpha=0.779)

Number	Scale Item	Factor Loadings
35	The library catalogue (OPAC) is easy to use	.721
21	I can't find information that I need in the library	.688
20	The library never has the materials that I need	.690
17	I can always ask a librarian if I don't know how to use equipment in the library	.791

The results of running an EFA using principal components analysis resulted in four factors structured as follows:

i) Barriers with library staff is conceptually defined as students' perceptions of library as intimidating, unapproachable, as well as too preoccupied to render any form of assistance whatsoever to them (Noor & Ansari, 2010) [High scores on this dimension means high anxiety]
ii) Affective barriers is conceptually defined as students' feelings of various shortcomings in the library [High scores on this dimension means high anxiety]
iii) Barriers with library technology is conceptually defined as students' uneasiness in using library technology [High scores on this dimension means lower anxiety]
iv) Cognitive barriers is conceptually defined as students' lack of familiarity with the various library resources and services [High scores on this dimension means high anxiety]

CONCLUSION

The purpose of the study was to evaluate the psychometric soundness of Bostick's (1992) multidimensional Library Anxiety Scale among medical undergraduates in a Malaysian public university. Of the 46 items that were employed to assess the library anxiety phenomenon, only 30 items were found to load on four interpretable factors.

The results of running an exploratory factor analysis yielded a 4-factor solution with the following sub-scales: barriers with staff (11 items); affective barriers (10 items); cognitive barriers (4 items) and barriers with library technology (5 items).

Each of the four sub-scales was subsequently examined for internal reliability and was found to have met the criteria of 0.70 as recommended by Nunnally and Bernstein (1994). Each of the items in the four sub-scales was found to correlate significantly (at $p<.01$) with the total score of the sub-scale. The correlation coefficients for each of the item in the respective sub-scales reflect the factor loading coefficients that were yielded as a result of running a principal component exploratory factor analysis. Hence, efforts to triangulate the findings of construct validity using item total score correlations were successful.

The findings of the study are quite consistent with previous studies with regards to the number of sub-scales and the internal reliability of the factors that were produced. Bostick's (1992) pioneering psychometric effect in developing a multidimensional scale resulted in a 5-factor solution that collectively explained 51.8% of the total variance in the library anxiety construct. Noor and Ansari's (2010) psychometric evaluation of Bostick's (1992) Library Anxiety Scale resulted in a 5-factor solution. The percent of the total variance explained by all the five factors in Bostick's (1992) study was 51.8% whilst that of Noor and Ansari's (2010) study was only 39.6%. This study yielded a 4-factor solution which collectively explained 47.9% of the total variance in the library anxiety construct. Hence, whilst the two aforementioned studies reported a 5-factor solution, this study yielded a 4-factor solution which reported total variance explained being less than that Bosticks' (1992) study but more than that of Noor and Ansari (2010).

In another study, Swigon (2010) developed a multidimensional scale called the Polish Library Anxiety Scale (P-LAS) which was based on Bostick's (1992) Library Anxiety Scale (LAS), Van Kampen's (2004) Multidimensional Library Anxiety Scale, Shoham and Mizrachi's (2001), Hebrew Library Anxiety Scale (H-LAS) and Anwar, Kandafiif and Al-Qallaf's (2004) Kuwait-Library Anxiety Scale (K-LAS). Swigon's (2010) study yielded a 6-factor solution with the following sub-scales: barriers with staff, affective barriers, technological barriers, library knowledge barriers, library comfort barriers and resources barriers.

The sub-scale, "barriers with staff" was identified by Bostick's (1992) study, by Noor and Ansari'S (2010) study as well as Swigon's (2010) study. This study also yielded an 11-item sub-scale called "barriers with staff". Hence this study provides incremental validity to the aforementioned studies. Additionally, all the three studies (Bostick, 1992; Noor and Ansari, 2010; Swigon, 2011) as well as the present study reported Cronbach's internal reliability coefficient alphas for this sub-scale to be above 0.70.

The sub-scale, "effective barriers" was reported by Bostick's (1992) study, Noor and Ansari's (2010) study and Swigon's (2011) study. This study also yielded a 10-item sub-scale called "affective barriers". All four studies reported the internal reliability coefficient alphas for this sub-scale to be above 0.70. As such, this study provides incremental validity to the aforementioned studies.

The sub-scale, "barriers with technology" was reported by Bostick's (1992) study as "mechanical barriers", by Noor and Ansari's (2010) study as "comfort with library technology" and by Swigon's (2011) study as "technological barriers". This study yielded a 5-item sub-scale called "barriers with technology" which reported the internal reliability coefficient alphas to be above of 0.70. This finding is consistent with the aforementioned studies and is not only yielding a similar but also an internally reliable sub-scale. Hence, this study provides incremental validity to the aforementioned studies.

The sub-scale, "knowledge of the library" was one of the factors yielded by Bostick's (1992). Noor and Ansari's (2010) reported a 3-item sub-scale similar to Bostick's "knowledge of the library" sub-scale. However, they named it as "cognitive barriers" sub-scale. Swigon's (2011) also reported a similar sub-scale called "library knowledge barriers". This present study reported a similar 4-item sub-scale called "cognitive barriers". The sub-scales for the aforementioned studies as well as for the present study reported internal reliability coefficient alphas to be above 0.70. Hence, this study provides incremental validity to the aforementioned studies.

RECOMMENDATIONS FOR FUTURE RESEARCH

The findings from this study are quite consistent with previous studies as far as matters relative to construct validity and internal reliability are concerned. Hence, when tested with a population of undergraduate medical students, Bostick's (1992) Library Anxiety Scale continues to demonstrate its validity and reliability as an instrument that measures library anxiety.

However, the scale needs to be translated into the Malay Language and its psychometric soundness tested with similar or other population of library users. Would similar dimensions emerge when Malay translated version of Bostick's Library Anxiety Scale is tested with a different library user population group? Would the percent of variance explained increase or decrease with a translated version of the scale? Would the internal reliability remain the same when the scale is translated into Malay? There are some questions that need to be addressed in conducting research on the most popular library anxiety instrument in the theoretical and empirical literature.

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