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Validation of Questionnaire on Motivating and Hindering Factors for Blood Donation

SHARIFAH AZDIANA TD[1], NURAINI SHAM[2], MASTURA MS *[3]
[1]*Regenerative Medicine Cluster, Advanced Medical and Dental Institute, UniversitiSains Malaysia, 13200, Kepala Batas, Pulau Pinang, Malaysia*
[2] *Hospital Sultanah Aminah, Johor, Kementerian Kesihatan Malaysia*
[3]*Oncological & Radiological Sciene Cluster, Advanced Medical and Dental Institute, Universiti Sains Malaysia, 13200, Kepala Batas, Pulau Pinang, Malaysia*
Correspondence to Mastura Mohd Sopian, E-mail: mastura_sopian@usm.my, Tel: +60-12-2652170 (Malaysia)
Fax: +60- 4- 5622803

ABSTRACT

Background: Questionnaires or surveys are widely used as research instruments. Using an existing questionnaire will save time and resources, but it has to be validated to ensure its suitability and relevance for the targeted respondents.
Aim: To validate an adapted questionnaire to suit local setting.
Methods: This study was conducted in Johor Bahru, Malaysia among 30 blood donors, who were university and college students. Content and face validity were performed. This questionnaire was adapted from an existing questionnaire that has two domains (motivating and deterring factors). The domain of motivating factors contains two questions that have 12 and eight items, respectively. Meanwhile, the domain of deterring factors contains a question with eight items. Internal consistency validity was done using Cronbach's alpha and exploratory factor analysisCronbach's alpha was used for the reliability test. Data was analysed using SPSS, version 22.
Results: The final adapted questionnaire consisted of three domains and 27 items. Cronbach's alpha values were acceptable in all domains, 0.739, 0.832 and 0.768.
Conclusions: The three domains with 27 items in this questionnaire were reliable and valid for use.
Keywords: Validation, Questionnaire, Motivating Factors, Deterring Factors

INTRODUCTION

Questionnaire is one of the various assessment tools available. Every designed questionnaire must be validated and tested for its reliability before it can be used in an actual study[1]. Survey questionnaires are usually developed based on thorough literature reviews, guidelines, and expert opinions[1,2]. The validation process would include translational validity (content validity and face validity), construct validity using factor analysis, while reliability and internal consistency use test-retest reliability, Cronbach's alpha and exploratory factor analysis Cronbach's alpha[1,2]. Content validity is done to ensure appropriateness and relevancy of the content in a questionnaire to fit the objective(s) of the study[2]. Content validity should be tested by several experts in the respective field, with a minimum of three persons required[3,4]. The expert reviewers must rate the relevance of each item using a 4-point Likert scale. Subsequently, the Content Validity Index (CVI) should be calculated to estimate the validity of the items[3]. Face validity is evaluated to determine whether the questionnaire is appropriate for the study purpose and content area. It is the easiest validation process to be done, but the weakest form. It assesses the appearance of the questionnaire in terms of practicability, comprehensibility, uniformity of style and formatting, and the understandability of the language used[2,4]. Once the validation process is complete, the questionnaire should be examined for its reliability. Reliability refers to the ability of a questionnaire to give consistent results and how well the items fit together[4]. The reliability of a questionnaire is expected to increase if more items are included in the questionnaire[1]. The acceptable items from a reliability test can be retained for the actual study[1]. However, in certain conditions, the reliability of the measurement tool may be improved by removing some items[1]. Nevertheless, each domain should contain an optimum number of items to produce adequate reliability[1]. Finally, the survey tool can be used in a larger population following the analysis of the pilot study and a revision of the questionnaire[1]. In the future, the validated questionnaire could be used in a similar type of population by other research[1]. In this study, we demonstrated how to validate an adapted questionnaire to suit local setting.

METHODS

Questionnaire design: A series of steps were taken to develop the research questionnaire. The current questionnaire was adapted from an existing questionnaire[5]. Adaptation of this questionnaire was consented by the author. Open-ended questions were used as they allow respondents to elaborate upon their responses. As more detailed information may be obtained using open-ended questions, these items were best suited to gather more information about a specific domain[6]. The current questionnaire had undergone forward and backward translation as it was supposed to be distributed in either the English language or Malay language based on the participant's preference. The translation process was assisted by Pusat Bahasa, USM Health Campus.
Validation of questionnaire: Validity is defined as the ability of the instrument to measure the attributes of the questionnaire[4], which can be divided into face validity and content validity.

Content validity is used to assess the appropriateness of the questions. A panel of content experts is required to review, rate, and validate the content of the questionnaire.

Face validity refers to how the questionnaire would look like while it measures the questions and items of interest. This type of validation is the easiest, but weakest form of validation because of the subjective assessment.

Reliability is important for stability and equivalence examination. It is used to consistently measure an attribute. The collected data were analysed using SPSS to determine the Cronbach's alpha for reliability. Cronbach's alpha value of more than 0.7 is acceptable. Subsequently, the questionnaire was amended based on the validation and reliability results.

Content validity: Items in each section were evaluated to ensure their relevance and appropriateness. Items should be simple, short, and written in a language familiar to the target respondents[6]. A meeting was conducted with two transfusion medicine specialists and a family medicine specialist to review the content of the questionnaire. They were asked to grade the questions and items based on relevance, clarity, simplicity, and ambiguity.

Pilot study: A pilot study was conducted in Johor Bahru, Johor involving blood donors among higher education students during the mobile blood drive conducted by the Transfusion Medicine Department, Hospital Sultanah Aminah Johor Bahru (HSAJB). Permission to conduct this pilot study was granted by the Director of Hospital Sultanah Aminah and the Head of Transfusion Medicine Department, HSAJB. A total of 30 blood donors participated in answering the questionnaire. The sample size was decided based on previous studies, which recruited 30 to 40 participants for questionnaire validation[7,8]. It was proven that to achieve 90% of efficiency to detect a problem, 22 participants would be needed. Therefore, 30 participants was a reasonable default value for pre-testing the questionnaire[8], which was held at Kolej Professional Mara Bandar Penawar and Southern University College. Face validity was conducted at the same time.

Face validity: Short interview sessions were conducted with every participant of the pilot study after they have completed the questionnaire. They were encouraged to offer any suggestions or opinions. All suggestions and opinions were noted and reviewed with content experts. All participants responded that they were able to understand the questions and items. The font and layout of the questionnaire were also appropriate and readable.

Reliability test: Data collected during the pilot study were analysed using Cronbach's alpha for the reliability test. Reliability was assessed for 3 domains (Motivating factors for donating blood, deterring factors for donating blood and appealing incentives). Table I summarises the results of the reliability test.

Table I: Summary of research questionnaire

Domain	Details	Number of items
1	Motivating factors for donating blood	12
2	Deterring factors for donating blood	8
3	Appealing incentives	8
Total		28

RESULTS

Content validity and Reliability test: Analysis of the pilot study was done including internal consistency validity using Cronbach's alpha and exploratory factor analysis that evaluate the construct validity. The content validity was verified and then adjusted after obtaining the recommendations of the experts. Table 2 summarises the results of the reliability test. For questions referring to motivating factors, Cronbach's alpha value was 0.739, which was acceptable. Meanwhile, questions referring to deterring factors showed Cronbach's alpha of 0.832, which was a good value. However, for questions referring to attractive incentives, the value was questionable at 0.698. The Cronbach's alpha for this question can be improved to 0.768 if item (d) (free health screening tests, such as cholesterol levels, diabetes or thalassemia screening test)was deleted.

Finalisation of questionnaire: Once the validation process was completed, the questionnaire was amended and finalised accordingly. This questionnaire was reliable and valid to be used for the target population in the actual study.The final questionnaire consisted of 27 items.

Table 2: Cronbach's alpha values for motivating factors, deterring factors, and attractive incentives

Domain	No. of items selected	Factor loading [a]	Cronbach's α
Motivating Factors	12	0.59– 0.78	0.739
Deterring Factors	8	0.68– 0.87	0.832
Attractive Incentives	7	0.57– 0.74	0.698

α = Cronbach's alpha

[a] Factor loading, using Principle Component Data Extraction Method and Varimax Rotation.

Table 3: Calculation of I-CVI, S-CVI/UA, S-CVI/Ave of items related to motivating factors, deterring factors, and attractive incentives.

Items	No. of expert rate as relevant (rated as 3 or 4)	No. of expert rate as not relevant (rated as 1 or 2)	I-CVIa	Inter-pretation
Domain 1: Motivating Factors				
To create a good practice / charity / To help others	3	0	1.00	Appropriate
Donating blood makes me feel like a hero	3	0	1.00	Appropriate
There is a shortage of blood supply to people in need	3	0	1.00	Appropriate
Donating blood is good for my health	3	0	1.00	Appropriate
My friends / colleagues donate blood	3	0	1.00	Appropriate
Lecturers / staff at my university or college donate blood	3	0	1.00	Appropriate
Someone in my family is a blood donor	3	0	1.00	Appropriate
Someone will be proud of me if I donate blood	3	0	1.00	Appropriate
I am interested in blood donation campaigns promoted	3	0	1.00	Appropriate

on social media, flyers, etc.				
I love the atmosphere / good conditions in the blood donation area / among staff and nurses on duty	3	0	1.00	Appropriate
I want the reward / incentive	3	0	1.00	Appropriate
I would feel bad if I do not donate	3	0	1.00	Appropriate
Domain 2: Deterring Factors				
Donating blood is painful	3	0	1.00	Appropriate
Donating blood is troublesome (e.g., time and location)	3	0	1.00	Appropriate
I do not like to see blood	3	0	1.00	Appropriate
Donating blood takes a long time	3	0	1.00	Appropriate
I dislike skipping class to donate blood	3	0	1.00	Appropriate
I felt worse after donating blood (lightheadedness, nausea, headache, blackouts / fainting, etc.)	3	0	1.00	Appropriate
Nurse / Staff is not friendly	3	0	1.00	Appropriate
Incentives are not attractive	3	0	1.00	Appropriate
Domain 3: Attractive Incentives				
Movie ticket / Amusement Park ticket / bowling ticket	3	0	1.00	Appropriate
Biscuits / titbits / free snacks after donating	3	0	1.00	Appropriate
Items that have the logo of the blood donation centre, such as T-shirts, towels, mugs or bags	3	0	1.00	Appropriate
	3	0	1.00	Appropriate
Acknowledgments / credit to total hours of community service performed / merit points	3	0	1.00	Appropriate
A chance to gain exemptions / skipping class	3	0	1.00	Appropriate
Shopping or food vouchers	3	0	1.00	Appropriate
Credits for pre-paid mobile phone	3	0	1.00	Appropriate
	S-CVI/ UA=1.00b		S-CVI/ Ave=1.00c	

[a] Item-level Content Validity Index (I-CVI) was calculated using the following formula: no. of experts giving rating of 3 or 4 divided by total number of experts. I-CVI interpretation: I-CVI > 0.79 = appropriate; 0.70 ≤ I-CVI ≤ 0.79 = needs revision; I-CVI < 0.70 = item is eliminated

[b] Scale-level Content Validity Index/ Universal Agreement (S-CVI/UA) was computed as follows: no. of items that all experts rated as relevant/total number of items

[c] Scale-level Content Validity Index/ Average (S-CVI/Ave) = Sum of I-CVI/to tal number of items

DISCUSSION

A survey questionnaire can be developed after a thorough literature review, and using guidelines and experts' opinions[1,2]. In this study, the research tool was adapted from a study by Finck et al, regarding motivating and deterring factors for blood donation among high school aged blood donors. This questionnaire was modified to suit the local setting. All items were discussed during the expert review meeting that involved several specialists, who are experts in their area of interest. They offered their inputs and ideas regarding the content, clarity, and suitability of the items to be included in the survey. This process was conducted in line with suggestions in previous studies[1,2]. Forward and backward translation of the developed questionnaire was performed with the help of experts from Pusat Bahasa, USM Health Campus. The aim was to provide comprehensive questionnaires to the respondents by producing two sets of questionnaires in Malay and English language. The questionnaires distributed to the respondents were based on their language preference. Each item in these questionnaires also underwent content validity by three specialists and were rated for appropriateness and relevancy[2]. As suggested by previous studies, content validity should be done by several experts in the respective fields, with a minimum of three persons required[3,4]. After they have rated each of the item's relevancy, Content Validity Index was calculated[3]. All items in the questionnaire showed Item-level Content Validity Index (I-CVI) of 1.00. Scale-level Content Validity Index/Universal Agreement (S-CVI/UA) and Scale-level Content Validity Index/Average (S-CVI/Ave) were also at 1.00, respectively. All items showed I-CVI > 0.79, which indicated that all items were appropriate to be included in the questionnaire. Therefore, all items were accepted. Some items were rephrased based on the discussion during the experts meeting to improve the clarity of the items.

A pilot study was conducted with a smaller number of the target group. Concurrently, face validity was conducted and data were collected for the reliability test. The respondents offered their opinions and suggestions to improve the questionnaire during face validity. All respondents were able to understand the questionnaire and the font was readable. Even though face validation is the weakest type of validation, it is still considered an important tool for researchers to assess the practicability, comprehensibility, uniformity of font, and the understandability of the language used by collecting feedbacks from the target group of respondents before the survey is distributed to the actual group[2-4].

Reliability was tested using the data collected during the pilot study. Questions related to motivating factors and deterring factors showed acceptable and good Cronbach's alpha values. A previous study reported that items with acceptable value or more from a reliability test can be kept in the actual study[1]. Thus, all items in these two sections were maintained. However, the Cronbach's alpha for the attractive incentives question was questionable. Hence, item (d) was removed to improve the value. This was in line with a previous study, which stated that in certain conditions,

removal of some items may improve the reliability[1]. Once all these processes have been completed, this questionnaire was validated and ready to be used in the actual study. The validated questionnaire can be used for a larger sample size and in a similar type of population in future research[1].

CONCLUSION

This paper has highlighted how an existing questionnaire was adapted to suit the local population. Removing items that are not suitable for the target respondents will improve the reliability of the adapted questionnaire.

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