

Psychometric properties of the Malay inventory for the perception of Muslims with hearing impairment

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ABSTRACT

Objective: The aims of this study are to measure the psychometric properties of the newly developed preliminary version of hearing impairment inventory for religious duties for Muslim adults, i.e., the *Inventori Persepsi Bagi Muslim Yang Memiliki Masalah Pendengaran (IPM3P)*, and to produce a final version of IPM3P.

Methods: The preliminary version of IPM3P that is used to investigate the perception of Muslim adults with hearing impairment towards Islamic understanding and practice has been tested in this study. The preliminary version of IPM3P consists of three domains (obligation, practice, and difficulty) with 59 items in total. Four phases of validity and reliability testing involved were: i) Content validation, ii) Pre-testing, face validity and proofreading, iii) Pilot study, and iv) Psychometric evaluation.

Results: The final version of IPM3P consists of 36 items. The findings from the present study suggest that the final version of IPM3P has excellent psychometric properties manifested by: i) good content validity, ii) excellently pretested, iii) good face validity, iv) good construct validity shown by principal component analysis and convergent validity, and v) good discriminant validity showed by divergent validity.

Conclusion: IPM3P shows good potential to be used as a tool in investigating perception of Muslim adults towards Islamic understanding and practice.

KEYWORDS:

Questionnaire development, effects of hearing loss, Islamic understanding and practice, psychometric properties

INTRODUCTION

Hearing loss was proven to affect quality of life including the religious life. Previous studies investigating the effect of hearing loss towards religious life among Muslim showed that hearing loss was proven to affect certain areas of Islamic understanding and practice, including prayers, and quranic recitation.¹⁻³ Previously, investigations on impact of hearing loss on Islamic practice were mainly concentrated on students and children population.¹⁻⁴ To our knowledge, there was no study investigating the effect of hearing loss towards

Islamic understanding and practice among the Muslim adult population. The absence of tools to measure the effects of hearing loss on Islamic understanding and practices among Muslim adults is among the factors contributing to the limited investigation in the area. As a solution, a preliminary version of a questionnaire to investigate the impact of hearing loss among adults in various area of Islamic understanding and practices, that is known as '*Inventori Persepsi Bagi Muslim Yang Memiliki Masalah Pendengaran*' (IPM3P) has been previously developed.^{5,6} The preliminary version of IPM3P consists of three domains (obligation, practice and difficulty) with 59 items in total, but has yet to be validated. The aims of this study were to finalize the development of IPM3P and subsequently to measure the psychometric properties of the final version of IPM3P. This was conducted by performing content validity, face validity, pre-testing, pilot study, and by distributing the IPM3P to a larger scale for psychometric evaluation. With the validation and reliability analysis, it is hoped that the IPM3P can be used as one of the tools to measure the impact of hearing loss on the various aspects of Islamic understanding and practice, as well as to serve as a rehabilitative tool in measuring the effectiveness of an intervention strategy, specifically for the Muslim adult population.

MATERIALS AND METHODS

There were four stages involved in this study. In stage 1, the first preliminary version of IPM3P that was developed by Rahmat et al. was content validated to produce the second preliminary version of IPM3P.⁵ In stage 2, the second preliminary version of IPM3P was pre-tested, face validated and proofread to produce the initial version of IPM3P. In stage 3, the initial version of IPM3P was piloted. In stage 4, the initial version of IPM3P undergo psychometric evaluation and was further finalized to produce the final version of IPM3P. Figure 1 shows the workflow involved in this study.

Materials

The first preliminary version of IPM3P which consists of 59 items - 18 items for obligation domain, 20 items for practice domain and 21 items for difficulty domain, was used as the questionnaire for this study.⁵ The items under obligation domain were mainly assessing the perception of Muslim with hearing impairment towards their obligation to understand Islamic teaching, and performing Islamic practice. The items

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under practice domain were designed to investigate the perception of Muslim with hearing impairment regarding their Islamic practice (i.e., how frequent they perform the Islamic practice). On the other hand, the items under difficulty domain were designed to assess the difficulty level faced by the subject in understanding and practice Islam. There were seven (7) sub-domains under each domain i.e., 'Aqidah', 'Ibadah', 'Muamalat', 'Da'wah', 'Akhlak', 'Tasawwuf', 'Sirah', with the exception to domain practice which contained all similar sub-domains as in the obligation and difficulty domain except 'Sirah' (refer to Table I in Rahmat et al. for the definition of each sub-domain).⁵ The inclusion of different sub-domain which represent different area of Islamic understanding and practice was to assess a wide area of Islamic understanding and practice in respect to the assigned domains. The preliminary version of IPM3P were made from a total of 36 positive and 23 negative statements. For the domain 'obligation' and 'difficulty', the response is rated as (1) 'sangat tidak setuju' (totally disagree), (2) 'tidak setuju' (disagree), (3) 'tidak pasti' (not sure), (4) 'setuju' (agree), to (5) 'sangat setuju' (totally agree). For the domain 'practice', the response is rated as (1) 'sangat tidak kerap' (very rarely), (2) 'tidak kerap' (Rarely), (3) 'tidak pasti' (not sure), (4) 'kerap' (frequent), to (5) 'sangat kerap' (very frequent).

Stage One: Content validation

Qualitative Content validation was conducted to assess if the items that were generated for the preliminary version of IPM3P were representative of the content and the respective domain.

Participants

A total of six content experts from two different academic backgrounds were involved for this stage, two experts from Islamic studies and four (4) experts from speech and hearing sciences. All the content experts hold at least a master's degree in their respective field.

Procedure

Six experts were given the content validation form and they were requested to specify whether an item is relevant or not relevant, in addressing: i) the issue that need to be investigated (i.e., the perception of Muslims with hearing impairment in understanding their obligation as a Muslim, and how they perceive their practice as a Muslim), ii) whether the item suits the respective domain, and iii) clarity of the item. The content experts were also asked to give their comment and recommendation for further improvement of the items. The recommendations from the content experts were considered and were taken into account to produce the second preliminary version of IPM3P (60 items) which was later pre-tested on Muslim adults with hearing impairment.

Data analysis

The percentage of agreement by the experts on the relevancy of each of the item was calculated using the following formula:

$$\text{Percentage of agreement} = \frac{\text{No of expert agreed that item is relevant}}{\text{Total number of content expert}} \times 100$$

The number of changes, item deletion and item that remained followed the suggestion that was given by the content expert was recorded.

Stage Two: Pre-testing, face validity & Proofreading

Before the initial version of the IPM3P was piloted to the target population (Muslim adults with hearing impairment), the 60 items of the second preliminary version of IPM3P that had been content validated was pre-tested and face validated to a group of Muslim adults. These stages were conducted to gauge the participant's understanding of the IPM3P's items and to probe the problems that the respondents encountered when responding to the items.⁷

Participants

The two groups of participants who were involved in this stage were a laymen group and an expert group. A total of twelve individuals consisting of two experts from an audiology background and ten laymen without specialized knowledge in hearing related sciences (audiology or speech language pathology) and Islamic studies were recruited for this stage. The laymen came from various occupation and education background, including cleaner, housewife, university students and professionals (engineers, administrative officers & teacher).

Procedure

A Pre-testing and face validity form was distributed to all the participants. Each of the participants were asked to rate the agreement on each item (yes/no) based on readability of the items, suitability of an item, layout and style, and clarification of words. The subjects were also asked if they understand each of the items, and if they had any comments and suggestions to improve the items. The comments and suggestions were taken into account in modifying the item before the items were sent for proofreading and distributed for pilot study. Before the pilot study was conducted, the modified second preliminary draft of IPM3P was proofread by a professional proofreader who has been working in the proofreading services for more than five years. There were some minor grammatical errors that had been identified based on the proofreading process and changes were made accordingly to produce the initial version of the IPM3P.

Data analysis

Pre-testing analysis was conducted based on three criteria: i) readability of an item, ii) clarity of words and, iii) layout and style. The face validity analysis was conducted based on the criteria of 'suitability of an item' to represent the IPM3P questionnaire and objectives. The percentage of experts' agreement on each criterion of pre-testing and face validity assessment was calculated using the following formula:

$$\text{Percentage of agreement for each criteria} = \frac{\text{No of subject agreed that item is relevant for the criteria}}{\text{Total number of subject}} \times 100$$

Number of changes, item deletion and item remained, following suggestion by the subject was recorded. Items that achieve < 80% of agreement in any of the assessed criteria was considered for deletion during stage five.⁸

Table I: Percentage of Experts Agreement on Item Relevancy for Content and face validity and pre-testing

Type of assessment	Criteria of assessment	Item Number	Percentage of subject who agreed with the item (%)
Content validity	Content	1-18, 20-24, 26-32, 34-49, 51-57, 59	100%
		19,33,50,58	83.3%
Face validity	Suitability of an item	25	66.7%
		1-12, 14-20, 22-24, 26-28, 30-38, 40-42, 46-52, 54-57, 59-60	100%
		13,21,29,39,43,44,45,53,58	91.7%
		25	83.3 %
Pre-testing	Readability of item	1-60	100%
		4-6, 9-11, 13, 15, 16, 19, 22-39, 41, 42, 46-52, 54, 55, 57, 59	100%
	Clarity of words	1-3, 8, 14, 18, 20-21, 40, 43-45, 53, 56, 58, 60	91.7 %
		7, 12, 17	83.3 %
	Layout & Style	1-6, 8-11, 13,14, 16,19,20,22-24, 26-31,33-38,40-42, 46-53, 55-57	100%
		7,12,15, 17, 18, 21, 25, 32, 39, 43-45, 54, 58, 60	91.7 %

Table II: Result of the first and second internal reliability analysis of stage 5

Domain	Cronbach alpha (α), n=77	
	First reliability analysis	Second reliability analysis
Overall internal reliability	0.95	0.94
Obligation domain	0.84	0.90
Practice domain	0.87	0.90
Difficulty domain	0.92	0.93

Table III: Criteria for removal of item or modification of domain and list of items involved

No	Criteria for removal of item or modification of domain.	Item number_ original domain
1.	Remove items that does not achieve 0.3 component loading.	29_P
2.	Remove item that has negative component loading.	13_O, 34_P
3.	Remove item that does not seem to represent the original domain from subjective evaluation, or/ and has poor component loading (e.g 0.4).	4_O, 9_O, 12_O, 18_O
4.	Remove item that does not really indicate the original domain based on PCA, and subjective evaluation shows that it does not suit the other suggested domain.	3_O, 25_P, 32_P, 33_P, 40_D, 41_D, 42_D, 46_D, 49_D, 60_D
5.	Remove item that has ambiguous domain based on PCA (e.g. component loading load into two or three components on less or similar strength).	12_O, 45_D, 47_D, 30_P
6.	Remove item that carries slightly similar meaning/ aspect to other item/s	53_D, 20_P
7.	Remove items based on the expert's comment from content validation	19_P, 26_P
8.	Rearrange item into another domain if subjective evaluation and component loading indicate that the item suits better in the suggested new domain, i.e., items load higher into the new suggested domain as compared to the original domain.	39_P, 57_D

a. The abbreviation of the original domain of the item. O: Obligation, P: Practice, D: Difficulty

Stage Three: Pilot study

To initially test the reliability of the initial version of the IPM3P in order to ensure that it is ready to be used in a larger scale, a pilot study was conducted on a small group of Muslim adults with hearing impairment.⁹ The process of the pilot study is discussed as follows.

Participants

A total of forty (40) Malay Muslim adults (>18 years old) with hearing impairment (pure tone average of air conduction above 25 dB HL at 0.5kHz, 1kHz, 2kHz and 4 kHz) were recruited from Kuantan, Pahang, Malaysia. The subjects consist of twenty three (23) males and seventeen (17) females with the age ranging from 19-75 years old. The degree of hearing loss among the subjects ranged from mild to profound hearing loss.

Procedure

The initial version of IPM3P questionnaire was distributed to the subjects. The subject was asked to rate their response for every item based on the Likert scale described in Materials. An informed consent was obtained from the subjects prior to their participation.

Data analysis

Reverse scoring was applied for all negative statements. Internal consistency of the initial version of IPM3P was calculated using the Cronbach's alpha value through the SPSS statistical 20. An Alpha value of > 0.7 was considered as acceptable.¹⁰

Stage Four: Further psychometric evaluation and finalisation of IPM3P

Further psychometric testing was conducted on a larger population to further evaluate the psychometric properties of

Table IV: Result of rotated component matrix from second principal component analysis (PCA)

Original Item number_original domain_revised domain ^a	Revised item number	Sub-domain	Component 1 (Obligation domain)	Component 2 (Practice domain)	Component 3 (Difficulty domain)
1_O	1	Ibadah	0.68		
2_O	2	Ibadah	0.58		
5_O	3	Akidah	0.68		
6_O	4	Akidah	0.69	0.37	
7_O	5	Muamalat	0.61		0.32
8_O	6	Akidah	0.68	0.41	
10_O	7	Tasawwuf	0.64	0.37	
11_O	8	Tasawwuf	0.62	0.43	
14_O	9	Akhlak	0.55	0.41	
15_O	10	Akhlak	0.51	0.32	
16_O	11	Da'wah	0.75		
17_O	12	Da'wah	0.66		
21_P	13	Ibadah	0.31	0.67	
22_P	14	Ibadah		0.67	
23_P	15	Ibadah		0.65	
24_P	16	Akidah		0.80	
27_P	17	Muamalat	0.34	0.68	
28_P	18	Muamalat	0.35	0.68	
31_P	19	Muamalat		0.68	
35_P	20	Tasawwuf		0.67	
36_P	21	Akhlak		0.70	
37_P	22	Akhlak		0.74	
38_P	23	Da'wah		0.76	
57_D_P	24	Da'wah		0.52	
39_P_D	25	Da'wah			0.74
43_D	26	Ibadah			0.65
44_D	27	Ibadah			0.80
48_D	28	Akidah	0.46		0.61
50_D	29	Muamalat			0.76
51_D	30	Muamalat	0.54		0.69
52_D	31	Muamalat	0.60		0.61
54_D	32	Tasawwuf	0.45		0.61
55_D	33	Tasawwuf			0.66
56_D	34	Akhlak	0.61		0.47
58_D	35	Da'wah			0.76
59_D	36	Da'wah			0.81

a. The abbreviation of the original and revised domain of the item. O: Obligation, P: Practice, D: Difficulty.

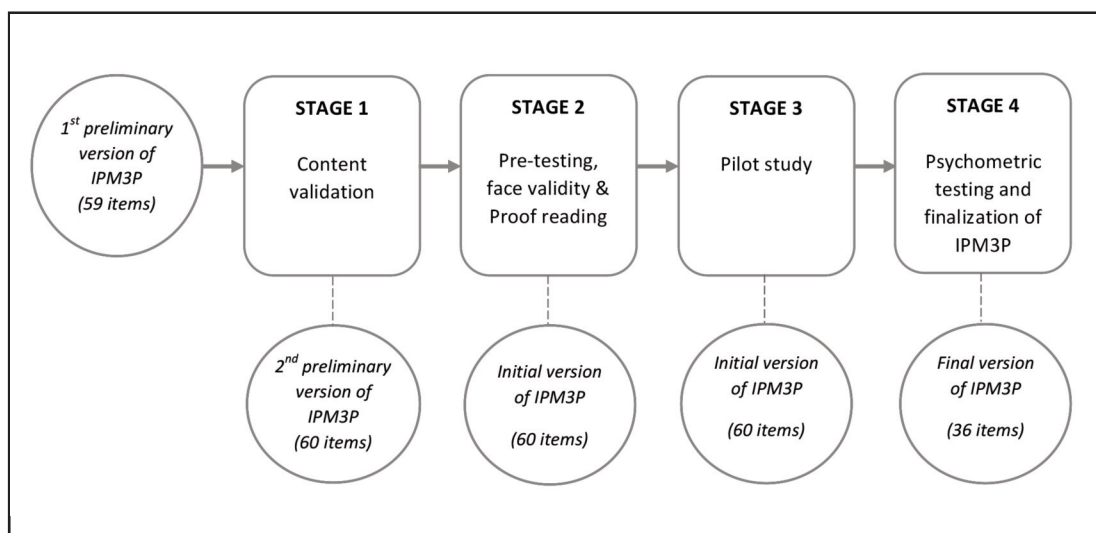


Fig. 1: Workflow of IPM3P development.

the items. The input from the psychometric analysis, together with the input from stage two to four was taken into account to produce the final version of the IPM3P.

Participants

A total of seventy-seven (77) Muslim adults with hearing impairment (similar criteria as in the pilot study) were recruited from Kuantan, Pahang, Malaysia. Subjects consist of thirty-eight (38) males and thirty-nine (39) females with the age ranging from 18-79 years old. The degree of hearing loss among the subjects ranged from mild to profound hearing loss.

Procedure

Informed consent was obtained from the subjects prior to their participation. The initial version of IPM3P questionnaire was distributed to the subjects. The subject was asked to rate their response for every item based on the Likert scale described in Materials section.

Data analysis

All the responses and data were analysed using SPSS statistical 20 for psychometric properties evaluations. To measure the psychometric properties of this new scale, three statistical analyses were performed:

- i) Internal reliability analysis using Coefficient alpha: similar criteria as described in pilot study was used.
- ii) Factorial analysis using principal component analysis (PCA): The PCA was conducted to assess the construct validity of the questionnaire. Two assumption of PCA were checked before proceeding the analysis- i) Kaiser-Meyer-Olkin (KMO) value should be > 0.5 , and ii) the p-value of Bartlett's test of sphericity should be < 0.05 .¹¹
- iii) Inter-item correlation analysis (for convergent and divergent validity): Pearson correlation was used to analyse the data and correlation coefficient (r) value was noted to determine the correlation strength.

A few steps of psychometric evaluation and modification of questionnaire were involved in this stage:

- i) First psychometric evaluation: The internal reliability analysis and PCA were conducted on the initial version consisting of 60 items (similar version as in the pilot study).
- ii) Removal of item and modification of domain based on the first psychometric result with additional input from stage two to four: the identification of domain was made based on the subjective evaluation and value of component loading. A few criteria (as listed in Table III) were set in order to decide whether an item should be removed or if the original domain needed to be changed. A total of 36 items were finally selected during this step to proceed with the second psychometric evaluation.
- iii) Second psychometric evaluation: second internal reliability analysis, PCA, and inter-item correlation (for convergent and divergent validity) were performed on the new set of 36 items.
- iv) Finalisation of IPM3P: Based on the result from the second psychometric evaluation, the new set of 36 items of IPM3P was finalised.

RESULTS

Stage One: Content validity

Six experts were asked to specify the relevancies of each item and the responses were tabulated in Table I. Overall, $>80\%$ of the expert agreed that majority of the items were relevant, with the exception to item number 25 which only obtained 66.7% of experts agreement. Item number 25 will be considered for removal following other validation and reliability analysis in stage five. Based on the analysis of the original 59 items, 25 items remained, 33 items had been modified, and one item had been split into two items. These yielded a new total of 60 items (18 items for obligation domain, 21 items for practice domain, and 21 items for difficulty domain) for the second preliminary draft of IPM3P. The suggestions by experts had included: changing of words to make the item more clear and specific, addition of phrase to suit the meaning, deletion of words to make the item shorter and more precise, and separation of item as the original item consisted of two different aspects; these were taken into account in modifying the items.

Stage Two: Pre-testing, face validity & Proofreading

The percentage of experts' agreement on each criterion of pre-testing and face validity assessment was calculated and presented in Table I. From the analysis of 60 items, 48 items remained and 12 items had been modified with no changes to the distributions of domains. The modification was based on the comment given by the subjects including the addition of some phrases to make the items more structured, and changing of words to make the items more understandable and simple. None of the items achieved $<80\%$ of agreement and were considered to be removed based on face validity and pre-testing result. Following the proofreading process, 55 items had been modified and 5 items remained. The modification was based on some minor grammatical errors that had been identified by the proofreader and the changes were made prior to pilot study.

Stage Three: Pilot study

The internal reliability analysis of the initial version of IPM3P yields an excellent overall Cronbach alpha value ($\alpha: 0.91$), with questionable to a good level of Cronbach alpha for the respective domains (obligation, $\alpha: 0.62$; Practice, $\alpha: 0.82$; difficulty, $\alpha: 0.89$). Although domain obligation has a questionable level of Cronbach alpha value, the overall internal consistency of the initial version of IPM3P was $\alpha: 0.91$. This shows that the initial version of IPM3P has good potential and is ready to be tested to a larger population for further psychometric testing.

Stage Four: Further psychometric evaluation and finalisation of IPM3P

a) First psychometric evaluation

The first psychometric evaluation was conducted on the initial version consisting of 60 items (similar version as in the pilot study). The internal reliability analysis and PCA were performed for the first psychometric evaluation.

i) Internal reliability analysis

The first reliability analysis on the initial 60 items yields an excellent overall Cronbach alpha value, with a good to excellent alpha value for each respective domain. The result

of the first and second reliability analysis was tabulated in Table II for easy comparison.

ii) First principal component analysis (PCA)

The first principal component analysis (PCA) was conducted to study the construct of the initial version of IPM3P. The analysis revealed a Kaiser-Meyer-Olkin (KMO) value of 0.64 suggesting that the degree of common variance among the variables was 'mediocre' bordering on 'middling', indicating an adequate sample size for conducting the PCA. The Bartlett's test of sphericity showed $p < 0.001$, suggesting that the domains of IPM3P were independent of each other.

The PCA with Varimax rotation was conducted using the extraction method based on a fixed number of domain (3) that was previously set for IPM3P (obligation, practice and difficulty). Items with coefficient value < 0.3 was suppressed. The cumulative percentage of variance explained by the three components was 49.02%. A majority of the items under the practice domain load to component one, while the majority of items under the obligation domain load into component two, and a majority of items under the difficulty domain load into component three. From the first PCA, it can be seen that all of the items with the exception of two (item 29 & 34) have a component loading of > 0.3 in at least one of the components.

b) Removal of item and modification of domain based on the first psychometric result with additional input from stage two to four.

In this step, discussion with the experts from the research team was conducted to evaluate the items and finally a consensus was achieved either to retain, or to remove the item, or to change the domain of the item. A few criteria were set in order to decide whether an item should be removed or if the original domain needed to be changed. The criteria are listed in Table III, together with the number of items that was involved. A total of 24 items were deleted (Obligation-6 items, Practice - 9 items, Difficulty - 9 items), and 2 items were rearranged into new domain. A total of 36 items (12 items for each- obligation, practice and difficulty, domain) were finally selected during this step to proceed with the second psychometric evaluation.

c) Second psychometric evaluation

Second psychometric evaluation was conducted to the new set of IPM3P which consisted of 36 items (12 items for each- obligation, practice and difficulty, domain). The psychometric evaluation includes internal reliability analysis, PCA, and inter-item correlation.

i) Second internal reliability analysis

The second reliability analysis on the final 36 items yields an excellent overall Cronbach alpha value, with an excellent alpha value for each respective domain. From Table II, it can be seen that the result for the second reliability analysis on the new set of 36 items of IPM3P has improved as compared to the first reliability analysis on the 60 items, particularly on the alpha value for each domain. The new set of 36 items of IPM3P shows excellent internal consistency and could be considered as the final version of the IPM3P depending on the result from the second PCA below.

ii) Second principal component analysis

A second PCA was conducted to see if the results would improve with the final set of 36 items of IPM3P. The analysis revealed that the Kaiser-Meyer-Olkin (KMO) value improved to 0.78 compared to that of 0.64 from the first PCA analysis, suggesting that the degree of common variance among the variables was 'middling', indicating an adequate sample size for conducting the PCA. The Bartlett's test of sphericity showed $p < 0.001$, suggesting that the domains of IPM3P were independent of each other.

The PCA with Varimax rotation was conducted again using similar method as in the first PCA analysis. The cumulative % of variance explained by the three components was improved to 56.20% compared to 49.02% from the first analysis. The results of the PCA based on the three components or domain were presented in Table IV. A much clearer separation of domains can be seen, with all the revised items under the obligation, practice and difficulty domain loaded to component one, component two, and component three, respectively. Similar to the first PCA analysis, identification of the domain that suited the items was made based on subjective evaluation, supported by the value of component loading. In the case of an item that loaded into two components, the component with the higher component loading was chosen to represent the domain of the item- provided that the subjective evaluation showed that the item suited the suggested domain (the value of the dominant component loading is bolded in Table IV). This rule was particularly applicable for all items except for item number 56_D where the component loading loaded higher into component one (obligation), as compared to component three (difficulty). However, the item was retained in the difficulty domain since the subjective evaluation showed that the item was better suited in the difficulty domain. None of the items have either a negative or < 0.3 component loading value.

iii) Inter-item correlation for convergent and divergent validity

Inter-item correlation was performed to measure the convergent and divergent validity of the questionnaire. For convergent validity, inter-item correlation was performed between item with the same domain, and convergent validity was met when the inter-item correlation was found to be significant ($p < 0.05$) and $r > 0.03$.¹⁰ A majority (93.43%) of the inter-item pair for the overall IPM3P met the convergent validity ($p < 0.05$, $r > 0.03$), with the percentage of inter-item pair that met the convergent validity for all the domains ranging between 86.36%- 96.97%. The result for the convergent validity analysis was excellent, and thus the convergent validity for IPM3P was established.

For divergent validity, inter-item correlation was performed between items from different domain (obligation vs. practice, obligation vs. difficulty, and practice vs. difficulty). Divergent validity was met when the inter-item correlation was found to be insignificant ($p < 0.05$), or when correlation coefficient is not strong ($r < 0.8$), and/ or when a difference was observed when comparing the correlation coefficient (r) and p -value to that of convergent validity result.^{10,12} 100% of the inter-item pairs had correlation coefficient (r) < 0.8 . In addition, 44% of the inter-item correlation was not significant, as compared to

only 2.5 % of non-significant inter-item correlation for convergent validity. The result for divergent validity analysis was excellent and thus the divergent validity for IPM3P was established.

d) Finalisation of the IPM3P

Looking at the result from the second psychometric evaluation, the new set of 36 items (12 items for each obligation, practice, and difficulty domain) of IPM3P shows good content validity, excellent internal reliability as well as excellent construct validity from the PCA, and inter-item correlation for convergent and divergent validity. Thus, the research team came to a consensus to use the new set of 36 items of IPM3P as the final version of IPM3P. The revised item number was assigned for each item as listed in Table IV.

DISCUSSION

The aims of this study were achieved, i.e., to finalise the development of IPM3P, and to measure the psychometric properties of the final version of IPM3P. During the initial stage of IPM3P item development, the initial version of IPM3P consisted of quite a large number of items representing each domain and sub-domain (59 items). The development of a large number of items during initial stage was recommended as to prepare for any item deletion following the later stage of psychometric analysis. 13 During the selection of items in stage four, the item with a good component loading was selected and the selection was performed with the aim to have at least one item representing each sub-domain. The research committee had managed to include at least one or more items representing all sub-domains that were identified during the sub-domain generation, i.e., 'Akidah', 'Ibadah', 'Muamalat', 'Da'wah', 'Akhlak', and 'Tasawwuf', with the exception of the sub-domain 'Sirah'. The final version of IPM3P (a set of 36 items) does not include any item under the domain 'Sirah' as all of the items (two items) under this sub-domain have poor construct validity (based on the PCA); however, the exclusion of this sub-domain from the final version of IPM3P was not an issue as the aim to have items representing the different sub-domains was to assess a wide area of Islamic understanding and practice, which could be achieved through the items from the other remaining sub-domains.

Hearing is an important sense that is involved in gaining a good Islamic understanding and is important in performing Islamic obligation.¹⁴ According to the principle of Islamic law (*Maqasid As-Shariah*), providing the means to understand and practice religion becomes a necessity as a way to protect faith. Therefore, an establishment of welfare and support system (including providing treatment and assistance) for Muslims with hearing impairment to understand and practice Islam (despite their disability) becomes a collective Islamic responsibility that is shared by the government, the community (including the hearing care professionals), the family, and the individuals themselves.¹⁴ Such support could be better provided when the perception of Muslims with hearing impairment has been enlightened and their practice is well understood, which could possibly be achieved through the development of IPM3P.

The psychometric evaluations have revealed that the IPM3P has the potential to be used as a tool to investigate the perception of Muslim adults with hearing impairment towards Islamic understanding and practice. Further confirmatory factor analysis (CFA) among larger samples (n>100) could be conducted to further confirm the three domain of IPM3P. Using the validated version of IPM3P, further investigation to probe the perception of adult Muslim with hearing impairment towards Islamic understanding and practice is needed. In addition, further study is needed to investigate the relationship between the factors that might be affecting the perception of adult Muslim with hearing impairment towards Islamic understanding and practice (as proposed in the theoretical framework of IPM3P development); i.e. attitude (obligation), perceived behavioral control (difficulty), and behavior (practice).⁵ In addition, the effect of hearing amplification in alleviating the difficulty faced by Muslim adult with hearing impairment in performing Islamic obligation should be further investigated.

CONCLUSION

The development of IPM3P serves as the preliminary work to further understand the religious need and religious difficulty among Muslim adults with hearing impairment. Findings from the present study suggests that the final version of IPM3P has excellent psychometric properties that have been manifested by: i) good content validity, ii) excellently pretested, iii) good face validity, iv) good construct validity that is shown by factorial analysis and convergent validity, and v) good discriminant validity that is shown by divergent validity. The psychometric evaluations have revealed that the IPM3P has the potential to be used as a tool to investigate the perception of Muslim adults with hearing impairment towards Islamic understanding and practice. Such understanding of the phenomenon may give an input on how this population could be assisted in terms of their religious duties.

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CONFLICT OF INTEREST

None to declare.

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