• Investigation •

Development and validation of a novel questionnaire regarding vision screening among preschool teachers in Malaysia

Shazrina Ariffin, Saadah Mohamed Akhir, Sumithira Narayanasamy

Faculty of Health Sciences, Centre for Community Health Studies (ReaCH), Universiti Kebangsaan Malaysia, Kuala Lumpur 50300, Malaysia

Correspondence to: Sumithira Narayanasamy. Faculty of Health Sciences, Centre for Community Health Studies (ReaCH), Universiti Kebangsaan Malaysia, Kuala Lumpur 50300, Malaysia. sumithira@ukm.edu.my

Received: 2023-07-20 Accepted: 2024-03-06

Abstract

● **AIM:** To develop and evaluate the validity and reliability of a knowledge, attitude, and practice questionnaire related to vision screening (KAP-VST) among preschool teachers in Malaysia.

● **METHODS:** The questionnaire was developed through a literature review and discussions with experts. Content and face validation were conducted by a panel of experts (*n*=10) and preschool teachers (*n*=10), respectively. A pilot study was conducted for construct validation (*n*=161) and test-retest reliability (*n*=60) of the newly developed questionnaire.

● **RESULTS:** Based on the content and face validation, 71 items were generated, and 68 items were selected after exploratory factor analysis. The content validity index for items (I-CVI) score ranged from 0.8-1.0, and the content validity index for scale (S-CVI)/Ave was 0.99. Internal consistency was KR20=0.93 for knowledge, Cronbach's alpha=0.758 for attitude, and Cronbach's alpha=0.856 for practice.

● **CONCLUSION:** The KAP-VST is a valid and reliable instrument for assessing knowledge, attitude, and practice in relation to vision screening among preschool teachers in Malaysia.

● **KEYWORDS:** validity; reliability; preschool teachers; vision screening; questionnaire

DOI:10.18240/ijo.2024.06.16

Citation: Ariffin S, Mohamed Akhir S, Narayanasamy S. Development and validation of a novel questionnaire regarding vision screening among preschool teachers in Malaysia. *Int J Ophthalmol* 2024;17(6):1102-1109

INTRODUCTION

The World Health Organization (WHO) estimates that 2.2 billion of the world's population have visual impairment and blindness. Of these, 1 billion are reported to have preventable visual impairment and blindness[1]. It has been suggested that this number can be reduced to half if appropriate interventions are provided early. Steps such as establishing a community vision care centre, organizing more research on ocular health systems, providing an effective vision care system, and raising public awareness about vision care can be taken towards the effort. Raising public awareness is important to ensure that the community has the right information to act on the health issues they are dealing with. Involving the community itself will make this campaign more productive and effective.

A national survey conducted in Malaysia in 2014, which was published in 2018 shows that cataract (58.6%), diabetic retinopathy (10.4%) and glaucoma (6.6%) was the main cause of blindness, while cataract (68%) and uncorrected refractive error (14.4%) was the main cause of visual impairment[2]. According to a study conducted in Ghana, refractive error (51.5%) was the most common cause of visual impairment among primary school children[3]. Another study of visual impairment prevalence among preschool children in Malaysia, conducted by Chew *et al*[4], found that 95.4% of the children referred for formal eye assessment had an uncorrected refractive error, with 84% having astigmatism. Evidence suggests that children's vision screening effectively prevents early visual anomalies and amblyopia[5].

Most vision screening programs are targeted at school-aged children as it is more effective in preventing visual impairments[5]. A study on myopia prevalence in Taiwan, China concluded that during the study period, the cause of increasing myopia severity among school children was due to the onset of myopia at an early age. This earlier onset was suggested to be due to the competitive school environments which leads young children engaging in longer hours of near task every day. The study suggests that attention should be given to preschool children in order to reduce myopia prevalence[6].

To achieve this, a nationwide vision screening program should be implemented for all preschool children to benefit. A multidisciplinary approach involving eye care professionals (optometrists, ophthalmologists, governmental agencies, school authorities, the healthcare industry, paediatricians and family physicians should come together to tackle this issue[7].

A previous study found that teachers play an important role and are well-positioned to help perform vision screening in preschool children[8]. The outcome of this study shows that, out of the 700 children screened, 9.4% was referred for comprehensive eye examination, with 67.7% sensitivity and 97.4 specificity. Screening young children is challenging, however, with involvement of teachers, children might feel more comfortable and familiar compared to them being screened by strangers. Another study in Bangladesh also showed similar outcome, where teachers could perform vision screening with 68.0% sensitivity and 92.75% specificity[9]. In addition, teachers' participation in screening programs increases the likelihood of follow-up and treatment adherence[10]. This is due to the nature of teachers' work and their relationship with students and parents.

Thus, if teachers are involved in preschool vision screening programs, the effect of screening will benefit more preschool children. However, before implementing vision screening programs involving teachers, it is important to assess their knowledge, attitude, and practice regarding vision screening in children. Currently in Malaysia, vision screening is carried out by nurses for primary school children and by optometrists for preschool children, without teachers' involvement. However, this manpower is insufficient to cater to the entire Malaysian children population. Therefore, it has been suggested to involve teachers as part of the vision screening team.

In order to implement this, the level of teachers' knowledge, attitude, and practice (KAP) using questions specifically designed for the target population is pertinent. The questions conform to the Malaysian guideline for children's vision screening. Having data that is specific to the target population would be beneficial in the long run during the policymaking process pertaining to vision screening. To our knowledge, there has yet to be a validated instrument in Malaysia to assess KAP in relation to vision screening among preschool teachers. Therefore, this study aims to develop, validate, and determine the reliability of a questionnaire to assess KAP in relation to vision screening among preschool teachers in Malaysia.

SUBJECTS AND METHODS

Ethical Approval This study was approved by both the Community Development Department, Ministry of Rural Development Malaysia (Ref. No. KEMAS BPAK 620.02/01/01 Jld 20 [47]) and the Research Ethics Committee, Centre for Research, and Instrumentation Management (CRIM), Universiti Kebangsaan Malaysia (Ref. No. UKM PPI/111/8 JEP-2021-674).

Questionnaire Development A self-administered online questionnaire (Google Form) was developed following the standard procedure, which includes: 1) domain identification and item generation, 2) content and face validation, 3) assessment of construct validity and reliability[11-15]. The domain identified was KAP of preschool teachers towards preschool vision screening. Items were generated from the definition and concept of KAP. The questionnaire was developed based on a literature review of articles published in Science Direct, Scopus, Web of Science and Google Scholars using the keywords awareness, knowledge, attitude, practice, preschool teachers, and vision screening.

Content and Face Validity The questionnaire draft was sent out to expert panels for content validation. Ten expert panels were invited involving ophthalmologists, paediatric and public health optometrists, academicians and optometrists[16-17]. The questionnaire was reviewed and rated based on 4 criteria, namely: content relevance, clarity, simplicity, and ambiguity[17]. Expert panels' response was analyzed using the content validity index for items (I-CVI) and content validity index for scale (S-CVI) values. I-CVI was computed by determining the number of expert panels agreeing on the relevant item divided by the total number of experts[18]. In this study, items given a score of 1 or 2 were considered irrelevant, while items given a score of 3 or 4 were considered relevant (dichotomising the scale for analysis purposes). For example, if 8 panels scored 4 and 2 panels scored 1, it is calculated as (8/10=0.8). Thus, the I-CVI value for the item is 0.8.

S-CVI average (S-CVI/Ave) was used to calculate the proportion of experts who scored the items as relevant. This is calculated by averaging all the I-CVI values of the items[18]. Comments were also given for each item for improvement. Items chosen for restructuring were based on the clarity, simplicity, and ambiguity scale. Focus group discussion (FGD) was also conducted with expert panels to clarify the comments and finalize the questionnaire. FGD session was conducted and recorded through an online platform (Google Meet). Detailed discussion was conducted during FGD to ensure the relevancy, clarity and accuracy of language in both English and Malay. This is carried out to ensure the equivalency between Malay and English versions.

Next, the questionnaire draft was distributed to ten preschool teachers using convenience sampling (five each from public and private preschools) for the face validation process. The teachers involved were all from different preschools. The participants were asked to evaluate the questionnaire based on its readability, feasibility, and general formatting. Their feedback was used to improve the questionnaire. Items were

either edited, removed, or remain unchanged accordingly. This revised questionnaire was used for the pilot study.

Pilot Testing of Questionnaire This pilot study aimed to examine the feasibility, time taken to answer the questionnaire, difficulty level, construct validation and reliability. It was a cross-sectional study conducted between August 2021 to November 2021 in the state of Perak. The sample size for this pilot study was determined based on subject: item ratio 5:1[19-20]. The sample size needed at this stage was 145 preschool teachers (Total attitude and practice items=29, 29×5=145). The inclusion criteria for this study were preschool teachers teaching in public preschools registered with the Community Development Department (KEMAS) or private preschools registered under the Ministry of Education Malaysia. The questionnaire was distributed online using Google Forms. The questionnaire was resent to the pilot study participants for reliability testing after two weeks[21]. The process of developing, validating and reliability testing this questionnaire is summarized in Figure 1.

Statistical Analysis Statistical analysis was done using Statistical Package for the Social Sciences (SPSS for Windows, version 26). Descriptive statistics were carried out to report the respondent's demographic data. Item analysis was performed in Microsoft Excel to identify the difficulty (Dif-I) and discrimination index (Dis-I) in the knowledge domain. Dif-I is the proportion of teachers answering the item correctly[22]. Item difficulty index (Dif-I) between 0.2-0.8 is accepted for an item[23]; values more than 0.8 indicate that an item is too easy, while values less than 0.2 indicate that an item is too difficult to answer.

Item discrimination index (Dis-I) will determine if an item is able to differentiate between teachers with a high level of knowledge and teachers with a low level of knowledge[24]. It is calculated by using the formula, Dis-I=(UG-LG)/n, where UG is the number of teachers in the 27% upper group who answered correctly, LG is the number of teachers in the 27% lower group who answered correctly, and *n* is the number of teachers in the upper and lower group[22]. A value between 0.20 to 0.29 shows that the items have an acceptable discrimination index, a value between 0.30 to 0.39 is good and a value more than 0.40 is very good[23].

Items for attitude and practice domains were analyzed using exploratory factor analysis (EFA) principal component with varimax rotation for construct validity and questionnaire refinement. Eigenvalue more than 1, scree plot and cumulative percent of variance extracted were used as the criteria to determine the number of factors to remain[25-26]. In order to achieve a simple structure, each factor was made sure to have at least three variables and each variable must load only onto 1 factor[27].

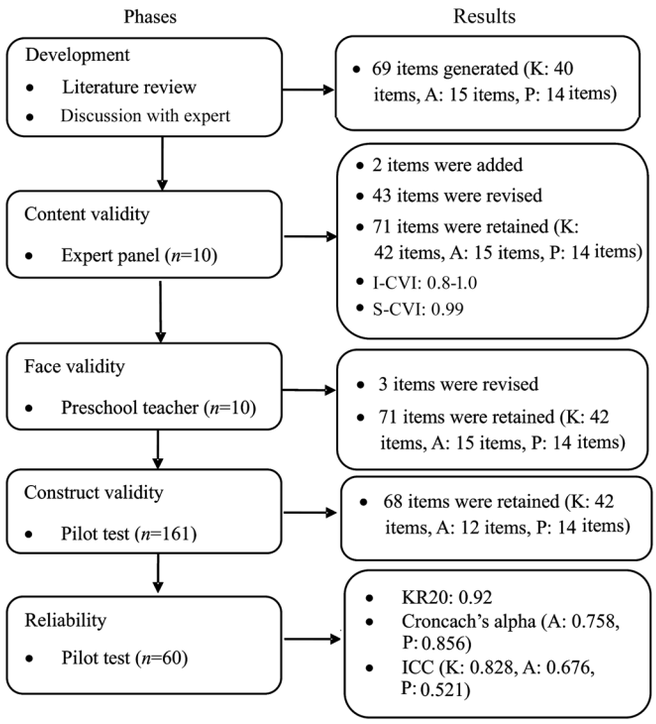

Figure 1 Flowchart of development, validation, and reliability testing of questionnaire K: Knowledge; A: Attitude; P: Practice; KR20: Kuder-Richardson 20.

Internal consistency was measured using Cronbach alpha value for the attitude (Likert scale) and practice (Likert scale) domain, while Kuder-Richardson 20 (KR20) was used for the knowledge (binary scale) domain. A questionnaire with an internal consistency value of more than 0.7 is considered good[28]. Items that remained in this questionnaire were selected based on item analysis of the knowledge domain, EFA analysis of the attitude and practice domain, internal consistency, and content consideration. Test-retest reliability was analyzed using the intra-class correlation coefficient (ICC). Values between 0.75 to 0.9 indicate that the questionnaire has good test-retest reliability[29-30]. *P*-values less than 0.05 were considered statically significant.

RESULTS

Questionnaire Development Relevant manuscripts were reviewed from a database search. The questionnaire was developed bilingually (Malay and English), consisting of 69 items. The knowledge domain has 40 items, the attitude domain has 15 items and the practice domain consists of 14 items. The knowledge domain consisted of binary scale questions with the choice of "Yes" or "No". Likert scale was used to evaluate attitude (strongly disagree, disagree, agree, and strongly agree) and practice (never, sometimes, often, and always) domain. A 4 options Likert scale was chosen for this questionnaire to avoid midpoint responders[31].

Content and Face Validity The I-CVI value (relevance scale) was between 0.9 to 1.0, indicating none of the items

Table 1 Domain and subdomain of KAP-VST questionnaire at the initial stage

Domain	Knowledge	Attitude	Practice
Sub-domain	Types of visual impairment in children	Attitude towards visual impairment in children	Practice towards children with visual impairment
Sub-domain	Signs and symptoms of visual impairment in children	Attitude towards vision screening training	Practice on vision screening
Sub-domain	Effect of visual impairment	Effect of visual impairment	Practice on visual hygiene
Sub-domain	Treatment for visual impairment	Attitude towards visual hygiene	-
Sub-domain	Children vision screening	-	-
Sub-domain	Visual hygiene	-	-

should be deleted, while the S-CVI/Ave (relevance scale) value was found to be 0.99, indicating a good S-CVI/Ave value[18]. As a result of the FGD session, two items were added to the knowledge domain as they were considered relevant in determining teachers' knowledge regarding preschool vision screening. Three items were then edited, which involved paraphrasing and the addition of technical definitions for clarity based on face validation. Overall clarity, font appropriateness and questionnaire neatness were agreed to be acceptable by the ten preschool teachers. This draft questionnaire was then used for the pilot study. At this stage, the questionnaire consists of 71 items (knowledge: 42, attitude: 15 and practice: 14). The domain and subdomain developed during this stage are summarized in Table 1.

Pilot Testing of the Questionnaire

Demographic characteristics A total of 161 preschool teachers responded to the questionnaire distributed. The average time taken to complete this questionnaire was 15±8min. Majority of the participants were female (98.1%), Malay (93.2%), and public preschool teachers (93.2%). The demographic characteristics of preschool teachers involved in this pilot study are presented in Table 2.

Table 2 Demographic characteristics of study participants

Characteristics	*n*=161
Age (y), mean±SD	39.78±10.40
Male, *n* (%)	3 (1.9)
Female, *n* (%)	158 (98.1)
Race, *n* (%)	
Malay	150 (93.2)
Chinese	8 (5)
Others (Orang Asli, Melanau)	3 (1.8)
Preschool type, *n* (%)	
Public	150 (93.2)
Private	11 (6.8)
Education level, *n* (%)	
SPM	21 (13.0)
Certificate	4 (2.5)
Diploma	120 (74.5)
Bachelor's degree	15 (9.4)
Others (PMR)	1 (0.6)
Period of service (y), mean±SD	13.70±9.14

SD: Standard deviation; SPM: Sijil Pelajaran Malaysia (Malaysian Certificate of Education); PMR: Penilaian Menengah Rendah (Lower Secondary Assessment).

Item analysis knowledge domain Based on item analysis of the knowledge domain, the Dif-I was found to be 0.80 and the Dis-I was 0.41 (Table 3). This indicates that the questionnaire is easy to answer and able to discriminate between teachers with a high and low level of knowledge regarding preschool vision screening.

Construct validity attitude and practice domain The Kaiser-Meyer-Olkin (KMO) test (0.867) and Barlett's test of sphericity (Chi-squared, df=1805.431,105; P<0.001) for the attitude domain was fulfilled, thus meeting the criteria for factor analysis. A 3 factor-solution was obtained from EFA with a total of 12 items and the total variance explained was 72.41%. Initially, the attitude domain contained 4 sub-domains with 15 items, later renamed after the EFA. During EFA, item A3i was removed as it resulted in split-loading. The reliability test after removal of A3i showed a low Cronbach alpha value (0.504). From the reliability analysis, another 2 items were removed to increase Cronbach's alpha. After removing A2iii and A2iv, Cronbach's alpha value of 0.758 was obtained for the attitude domain. A simple structure with a good reliability value was obtained after removing 3 items from the attitude domain. All retained attitude items also have acceptable factor loading of ≥0.4. Table 4 shows the final EFA analysis result of the attitude domain.

KMO (0.856) and Barlett's test of sphericity (Chi-squared, df=1275.174,91; P<0.001) were met to conduct EFA for practice items. EFA for the practice domain resulted in a 3 factor-solution with 14 items, with the total variance explained at 67.63%. All attitude items have good factor loading with ≥0.4 and were retained in the domain. Table 5 shows the result from the final EFA analysis of the practice domain.

Reliability The internal consistency KR20 for the knowledge domain was 0.93. This shows that the knowledge domain has a very high internal consistency. The reliability of attitude and practice domain was measured using Cronbach's alpha coefficient with 0.758 and 0.856, respectively. For test-retest

Table 3 The difficulty index and discrimination index of the knowledge domain

Items	Dif-I	Dis-I
Types of visual impairment in children		
Do you know that the following are the common visual impairments in children?		
K1i: short-sighted	0.90	0.23
K1ii: long-sighted	0.74	0.38
K1iii: astigmatism	0.65	0.68
K1iv: squint	0.85	0.28
K1v: amblyopia (lazy eye)	0.54	0.65
Signs and symptoms of visual impairment in children		
Do you know that the following are signs and symptoms of visual impairment in children?		
K2i: constant eye rubbing	0.87	0.35
K2ii: squinting eye to see an object	0.95	0.20
K2iii: headache	0.64	0.53
K2iv: watery eyes	0.81	0.45
K2v: misaligned eyes (squint)	0.87	0.35
K2vi: droopy eyelid	0.57	0.78
K2vii: child moves closer to the whiteboard to read or copy notes	0.85	0.43
Effect of visual impairment		
Do you know that untreated visual impairment can cause the following effects in children?		
K3i: blindness	0.74	0.43
K3ii: learning problem	0.97	0.13
K3iii: reduced quality of life in children	0.91	0.25
Treatment for visual impairment		
Do you know that visual impairment in children can be treated by the following methods?		
K4i: spectacles	0.98	0.08
K4ii: contact lens	0.46	0.45
K4iii: visual therapy (a set of customised visual activities designed to correct specific visual problem)	0.84	0.45
K4iv: surgical intervention	0.66	0.73
Children vision screening		
Do you know that the following are basic tests carried out during children vision screening?		
K5i: general inspection of the eye	0.93	0.28
K5ii: ability to view distant objects (distant visual acuity)	0.93	0.20
K5iii: depth perception (3-dimensional vision)	0.62	0.83
K5iv: misalignment of the eyes (squint)	0.83	0.50
K5v: ability to recognise colours	0.93	0.28
Do you know that the following tools are used in children vision screening?		
K6i: distant vision chart	0.94	0.20
K6ii: near vision chart	0.86	0.28
K6iii: pen torch	0.70	0.53
K6iv: occluder	0.83	0.45
K6v: stereopsis test kit	0.52	0.75
K6vi: colour vision test kit	0.85	0.40
Do you know when vision screening should be performed on children?		
K7i: at birth and periodically thereafter	0.73	0.48
K7ii: before starting formal education	0.64	0.73
K7iii: annually after the age of 5y	0.61	0.80
K7iv: immediately on a child showing the signs and symptoms of visual impairment	0.91	0.28
Do you know the following are the advantages of vision screening?		
K8i: Early detection of visual impairment among children	0.95	0.15
K8ii: Prevent blindness	0.83	0.45
K8iii: Improve the prognosis of visual impairment with early intervention	0.85	0.40
Visual hygiene		
Do you know that the following are good visual hygiene practices? 20-20-20-rule		
K9i: for every 20min spent for near work, take a break to look at something that is 20 feet away for 20s	0.70	0.65
K9ii: adequate lighting	0.93	0.23
K9iii: appropriate reading distance (30-40 cm)	0.93	0.18
K9iv: appropriate body posture while reading (upright and not lying up/down)	0.91	0.28
K9v: controlled screen time (<1h/d)	0.89	0.33

Dif-I: Item difficulty index; Dis-I: Item discrimination index.

Table 4 Exploratory factor analysis of items for attitude domain

Items	Loading on 3 factors			CITC
	1	2	3	
A4iii	0.825			0.754
A4ii	0.808			0.742
A2i	0.798			0.691
A2ii	0.788			0.688
A4i	0.774			0.769
A1i	0.716			0.525
A3iii		0.892		0.673
A3iv		0.891		0.599
A3ii		0.738		0.679
A1ii			-0.787	-0.280
A2v			0.748	0.035
A1iii			-0.718	-0.419

CITC: Corrected item-to-total score correlation.

Table 5 Exploratory factor analysis of items for practice domain

Items	Loading on 3 factors			CITC
	1	2	3	
P3iv	0.840			0.519
P3iii	0.830			0.607
P3ii	0.814			0.627
P3i	0.748			0.551
P3v	-0.625			-0.488
P2i	0.587			0.605
P2iii		0.902		0.441
P2ii		0.781		0.545
P2iv		0.753		0.569
P1iv		0.683		0.547
P1ii			0.859	0.623
P1i			0.823	0.519
P1iii			0.765	0.623
P1v			0.565	0.734

CITC: Corrected item-to-total score correlation.

reliability, 60 (37%) teachers completed the questionnaire for the second time. The intraclass correlation coefficient for knowledge, attitude and practice domain were 0.828, 0.676, and 0.521, respectively. These values suggest that this questionnaire has between moderate to good test-retest reliability.

Final Draft Questionnaire The final KAP-VST questionnaire consists of 3 domains: knowledge, attitude, and practice. The knowledge domain has 42 items with a binary scale. Correct answers will be given a score of "1", while the wrong answers will be given a "0" score. A total score of 42 is considered a full score, which results in 100%. Attitude and practice domains comprised of 12 and 14 items respectively with Likert scale. For the attitude domain, a favorable attitude will be given a score of 4, followed by 3, 2 and 1 for an unfavorable attitude. Like the attitude domain, the practice domain will also be given a score of 4 for good practice, followed by 3, 2, and 1 for poor practice. The total score of attitude domain is 48, while practice is 56. All the scores will be converted into a percentage which will be used to evaluate the level of KAP among preschool teachers towards preschool screening. The classification of teachers' level of KAP will follow Bloom's cut-off point, where the high KAP level is 80%-100%, 60%-79% for moderate and 0-59% for low[32]. The validated questionnaire is now ready to be used for further data collection.

DISCUSSION

This questionnaire was developed to evaluate the KAP level of preschool teachers in Malaysia towards preschool vision screening. In general, this questionnaire is valid and reliable for that purpose. During the development phase, 69 items were originally developed. After the FGD meeting, 2 items on near vision were added to the knowledge domain because the panel experts agreed that this was relevant to assess teachers' knowledge of vision screening. The entire knowledge domain has a good difficulty and discrimination index. None of the knowledge items has a difficulty index of less than 0.2, but some items have a value of more than 0.8. All items were retained because of their importance in determining the level of knowledge for each sub-domain. Most items with a value above 0.8 are known facts, so they are easier to answer and have a slightly lower discrimination index. For example, item K4i, which indicates "spectacles" as part of treatment for visual impairment, has a Dif-I of 0.98 and a Dis-I of 0.08. Even though the value is out of range, it is imperative to include "spectacles" as a treatment for visual impairment because these are the basic treatment options, especially for children. Similarly, in a questionnaire developed by Chen *et al*[23], some items were also retained due to their relevance and practicality, even though the Dif-I was out of range. The KR20 value (0.93) for the knowledge domain shows high reliability, proving that the retained items were good.

After piloting the 71 items questionnaire, construct validation was carried out on the attitude and practice domain. At this point, there were 42 knowledge items, 15 attitude items and 14 practice items. The analysis of the attitude domain using EFA loads into 3 factors (sub-domain) instead of 4 original factors (sub-domain) developed. Item A3i (vision screening training helps teachers in identifying visual impairment in children) was removed due to split-loading. It is advisable to avoid split-loading because each factor should have a definite group of interrelated items and individual items are valid[33]. Item A2iii (vision screening should only be conducted by health professionals such as nurses, registered optician, optometrist, or doctor) and A2iv (vision screening can be conducted by trained preschool teachers) was also removed as it reduces Cronbach's alpha value. This resulted in 12 items retained in the attitude

domain after EFA. Some items were loaded onto different factors, resulting in rearranging the items in the sub-domain and renaming the sub-domain. Rearrangement of the items in subdomain lead to a better comprehension of the questions. The removal and rearrangement of the items in attitude domain increased Cronbach's alpha value to 0.758. EFA is a statistical method to aid in making decision on retaining or removing an item in a questionnaire, apart from judgement by the research team to make sure the questionnaire has an accurate meaning to gather informative data for analysis[27].

As for the practice domain, only a few changes were made as the items were loaded into 3 factors similar to those developed. However, item P1iv (how often do you participate in programmed on children visual impairment?) was loaded into the practice on vision screening sub-domain, while item P2i (how often do you observe your students' behavior to identify visual impairment?) was loaded into practice on visual hygiene sub-domain. This shows that item P1iv is better suited to explain practice on vision screening while item P2i explains practice on visual hygiene[33]. At the end of EFA, 14 items were retained in the practice domain. Both attitude and practice domains were reliable, with 0.758 and 0.856 Cronbach's alpha values, respectively. The total number of items for the KAP-VST questionnaire was 68.

Regarding the test-retest reliability, the ICC for knowledge (0.828), attitude (0.676) and practice (0.521) demonstrated moderate to good test-retest reliability. This shows that the KAP-VST questionnaire is consistent when used to evaluate KAP related to vision screening among preschool teachers[29]. Even though the number of preschool teachers that completed the test the second time around was only 37% (60 teachers), the amount was still acceptable as the estimated number for test-retest to be carried out was 55, considering a significant level of 0.05, 80% of study power and expected ICC of 0.8[34]. The psychometric properties of the KAP-VST questionnaire could not be compared to other studies because of the limited information in the development and validation process of these KAP studies[35-37].

To the best of our knowledge, this is the first reported study on the development, validation, and reliability of the KAP level of preschool teachers regarding vision screening among preschool children in Malaysia. The strength of this study is the engagement from the multidisciplinary background during the development process. Inputs were gathered from teachers, public and private optometrists, ophthalmologists, academicians, and researchers in paediatric optometry and KAP study. Furthermore, this questionnaire was developed in both Malay and English language which enables its usage not only locally but internationally. However, further validation could be carried out to ensure that the questionnaire is suitable to be used for other population, taking into consideration of the differences in the healthcare and education system in different countries. The limitation of this study was that the preschool teachers involved were only mainstream education teachers. Testing on various preschool teachers, such as involving special education, can be done in future to gain better acceptance. Due to the crucial screening age at preschool, this questionnaire was developed for preschool teachers. However, it can also be further validated to be used by teachers across all stages.

In this study, the newly developed questionnaire (KAP-VST) is valid and reliable for assessing KAP regarding vision screening among preschool teachers in Malaysia. The validity and reliability of this questionnaire were found to be satisfactory. This questionnaire may be able to gather baseline data on the KAP level of preschool teachers regarding vision screening which will help to improve school vision screening programmes. The Ministry of Health and the Ministry of Education could also use such information to develop an effective training programme for teachers.

ACKNOWLEDGEMENTS

Conflicts of Interest: Ariffin S, None; **Mohamed Akhir S,** None; **Narayanasamy S,** None.

REFERENCES

1 World Health Organization. World report on vision. Vol. 214. Geneva; 2019. https://www.who.int/publications/i/item/9789241516570

2 Chew FLM, Salowi MA, Mustari Z, Husni MA, Hussein E, Adnan TH, Ngah NF, Limburg H, Goh PP. Estimates of visual impairment and its causes from the National Eye Survey in Malaysia (NESII). *PLoS One* 2018;13(6):e0198799.

3 Ceesay W, Abaidoo B, Braimah I. Prevalence of visual impairment among primary school pupils in the Ga West Municipality, Ghana. *Niger J Ophthalmol* 2022;30:85-91.

4 Chew FLM, Thavaratnam LK, Shukor INC, Ramasamy S, Rahmat J, Reidpath DD, Allotey P, Alagaratnam J. Visual impairment and amblyopia in Malaysian pre-school children-The SEGPAEDS study. *Med J Malaysia* 2018;73(1):25-30.

5 Jullien S. Vision screening in newborns and early childhood. *BMC Pediatr* 2021;21(suppl 1):306.

6 Lin LL, Shih YF, Hsiao CK, Chen CJ. Prevalence of myopia in Taiwanese schoolchildren: 1983 to 2000. *Ann Acad Med Singap* 2004;33(1):27-33.

7 Modjtahedi BS, Abbott RL, Fong DS, Lum F, Tan D; Task Force on Myopia. Reducing the global burden of myopia by delaying the onset of myopia and reducing myopic progression in children: The Academy's Task Force on Myopia. *Ophthalmology* 2021;128(6): 816-826.

8 Omar R, Knight VF, Zabidi AAA, Saat NZM, Li TX. Effectiveness of vision screening program conducted by pre-school teachers. *Malaysian J Public Heal Med* 2018;Special vo(1):41-50.

9 Mezbah U, Omar R, Isa ZM, Knight VF. Validity of vision screening program conducted by preschool teachers: an interventional study. *Med Hypothesis Discov Innov Ophthalmol* 2022;11(1):1-10.

10 Latorre-Arteaga S, Gil-González D, Bascarán C, Núñez RH, Morales MD, Orihuela GC. Visual health screening by schoolteachers in remote communities of Peru: implementation research. *Bull World Health Organ* 2016;94(9):652-659.

11 Aithal A, Aithal PS. Development and validation of survey questionnaire & experimental data–a systematical review-based statistical approach. *Int J Manag Technol Soc Sci* 2020;5(2):233-251.

12 Boateng GO, Neilands TB, Frongillo EA, Melgar-Quiñonez HR, Young SL. Best practices for developing and validating scales for health, social, and behavioral research: a primer. *Front Public Health* 2018;6:149.

13 Andrade C, Menon V, Ameen S, Kumar Praharaj S. Designing and conducting knowledge, attitude, and practice surveys in psychiatry: practical guidance. *Indian J Psychol Med* 2020;42(5):478-481.

14 Graham C, Gina A, Seeley J, Saman Y. Development of a questionnaire to assess mothers' knowledge, attitudes and practice with regard to childhood hearing loss and Universal Newborn Hearing Screening. *Int J Pediatr Otorhinolaryngol* 2023;165:111449.

15 Elangovan N, Sundaravel E. Method of preparing a document for survey instrument validation by experts. *MethodsX* 2021;8:101326.

16 Yusoff MSB. ABC of response process validation and face validity index calculation. *Educ Med J* 2019;11(3):55-61.

17 Zamanzadeh V, Rassouli M, Abbaszadeh A, Majd HA, Nikanfar A, Ghahramanian A. Details of content validity and objectifying it in instrument development. *Nurs Pract Today* 2014;1(3):163-171.

18 Polit DF, Beck CT. The content validity index: are you sure you know what's being reported? Critique and recommendations. *Res Nurs Health* 2006;29(5):489-497.

19 Bryman A, Cramer D. Quantitative Data Analysis with SPSS Release 10 for Windows. East Sussex: Routledge; 2002. 263p. https://www.taylorfrancis.com/books/9781134623396

20 Gunawan J, Marzilli C, Aungsuroch Y. Establishing appropriate sample size for developing and validating a questionnaire in nursing research. *Belitung Nurs J* 2021;7(5):356-360.

21 Toutouni H, Banihashem Rad SA, Boroumand F, Hoseini Pouya F. Designing and validating a questionnaire on oral health care knowledge, attitude, and practice of dental staff. *Journal of Contemporary Medical Sciences* 2021;7(5):276-281.

22 Karmakar S, Mukherjee S, Sikdar DP. Item analysis using a derived test data of knowledge, attitude and practice regarding drug addiction. *IASSI Q* 2021;40(4):171-187.

23 Chen ST, Soo KL, Rahman AA, Van Rostenberg H, Harith S. Development and pilot testing of nutrition knowledge, attitude and practice questionnaire in persons with disabilities (KAP-nOKU) among trainers in rehabilitation centres, Malaysia. *Pakistan J Nutrition* 2013;12(8):708-714.

24 Sharma LR. Analysis of difficulty index, discrimination index and distractor efficiency of multiple choice questions of speech sounds of English. *Int Res J MMC* 2021;2(1):15-28.

25 YanJu S, Yusuf M, YanMei S, Abdullah H. An exploratory factor analysis examining mandarin as a foreign language (MFL) learners' self-efficacy at Malaysian public universities. *Journal of Nusantara Studies* 2023;8(2):427-442.

26 Goretzko D, Pham TTH, Bühner M. Exploratory factor analysis: Current use, methodological developments and recommendations for good practice. *Curr Psychol* 2021;40(7):3510-3521.

27 Sürücü L, Yikilmaz İ, Maslakci A. Exploratory factor analysis (EFA) in quantitative researches and practocal considerations. OSF Preprints. 2022.

28 Ghani NDH, Abd Rahman MH, Mohamad Fadzil N, Mohammed Z, Mohd Rasdi HF, Shafie NS. Development and validation of parental knowledge, attitude and practice in eye problem among children questionnaire (PEPC-KAPQ). *PLoS One* 2023;18(9):e0291062.

29 Koo TK, Li MY. A guideline of selecting and reporting intraclass correlation coefficients for reliability research. *J Chiropr Med* 2016;15(2):155-163.

30 Moitra P, Verma P, Madan J. Development and validation of a questionnaire measuring knowledge, attitudes, and practices (KAP) to healthy eating and activity patterns in school children (HEAPS). *Nutr Health* 2021;27(2):199-209.

31 Simms LJ, Zelazny K, Williams TF, Bernstein L. Does the number of response options matter? Psychometric perspectives using personality questionnaire data. *Psychol Assess* 2019;31(4):557-566.

32 Azizan AA, Mohd Rasdi HF, Shahar S, Abdul Manaf Z, Haron H, Razalli NH. Knowledge, attitudes and Self-reported practices questionnaire on pureed diet preparation (KAP DYS Puree) among food handlers in Malaysian hospitals for dysphagia management: development, validity, and reliability testing. *Malays J Med Health Sci* 2023;19(3):187-195.

33 Taherdoost H, Sahibuddin S, Jalaliyoon N. Exploratory factor analysis; concepts and theory. *Advances in Applied and Pure Mathematics*, 27, WSEAS, 2014:375-382. Mathematics and Computers in Science and Engineering Series, 978-960-474-380-3.

34 Arifin WN. A web-based sample size calculator for reliability studies. *Education in Medicine Journal* 2018;10(3):67-76.

35 Agrawal D, Tyagi N, Nagesh SR. Awareness levels of school teachers regarding healthy vision and eye screening in Dist Gautam Budh Nagar, U.P. *National Journal of Community Medicine* 2018;9(8):614-617.

36 Alemayehu AM, Belete GT, Adimassu NF. Knowledge, attitude and associated factors among primary school teachers regarding refractive error in school children in Gondar city, Northwest Ethiopia. *PLoS One* 2018;13(2):e0191199.

37 Juggernath YM, Knight SE. Knowledge and practices of visual acuity screening by primary school educators. *Afr Vision Eye Health* 2015;74(1), Art. #309, 5 pages.