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Validity and Reliability of Knowledge, Attitude and Practice (KAP) Scale for Dog Bite Prevention in Children

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Abstract

Introduction: Rabies is a highly fatal disease that is mostly caused by a dog bite. The Dog Bite Prevention KAP scale is a 30-item scale that is designed to measure children's level of safety knowledge on dog's behaviour, precautionary behaviour around dogs, perceived vulnerability towards dogs and help-seeking behaviour following a dog bite. Therefore, this study aimed to determine the test-retest reliability and validity of outcome measures.

Methods: This questionnaire was administered to samples of school student aged from 13 years to 14 years at a secondary school located in Bau District, Sarawak. They were purposively selected for a baseline interview (Time 1) and a ten-day follow-up (Time 2). This study was conducted within four months, which were from 10 April to 31 August 2018. Descriptive analysis, content analysis, Cronbach's alpha, intra-class correlation and exploratory factor analysis were performed in this study.

Results: A total of 64 boys and 114 girls were involved in the study, whereby 79.2%, 10.1%, 7.9%, 2.2% and 0.6% of them were of Bidayuh ethnic, Chinese, Iban, Malays and other ethnic, respectively. The Cronbach's alpha was 0.796. The test-retest intra-class correlation was adequate, with 0.84 for perceived vulnerability towards dogs and 0.81 for precautionary behaviour around dogs. Principal components analysis with varimax rotation resulted in two factors, which explained 39% of the variance (perceived vulnerability towards dogs) and 49% of the variance (precautionary behaviour around dogs).

Conclusion: The questionnaire is a valid and reliable tool for a dog-bite prevention survey.

Keywords: *Knowledge*, *Precautionary*, *Vulnerability*, *Help-seeking*

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Introduction

Dog bite remains a major public health (Ogundare et al., 2017) and clinical problem worldwide. It is not only associated with high morbidity and mortality as a consequence from the severity of a dog bite injury, but the victims are also at high risk of contracting rabies from an attacking rabid dog. Rabies often results in a fatal outcome once it is progressed to the symptomatic stage and it occurs in all continents, except Antarctica (World Health Organisation, 2017). Dog-mediated rabies were reported to cause more than 99% of human infections (World Health Organisation, 2019) and more than 95% of human mortalities in Asia and Africa (Hampson et al., 2015) as compared to other animals.

The majority of dog bite victims are among children (Abubakar & Bakari, 2012), mainly males aged below 15 years (Ghosh et al., 2016). Younger children also tend to be bitten by their family pet dog, which is familiar to them (Davis et al., 2012; Reisner et al., 2011). In addition, a study by Seligsohn (2014) discovered that family pet dogs were responsible for the majority of dog bite incidences as compared to stray and unfamiliar dogs**.** Regrettably, the majority of dog bite victims do not seek treatment despite of being aware that asymptomatic rabies is 100% vaccine-preventable disease (Shah et al., 2012). Adversely, poor access to appropriate post-exposure prophylaxis treatment following a dog's bite and inadequate availability of medical resource may also be inferior and expensive or that does not exist in a certain locality had also contributed to the high number of mortality rate (Zaidi et al., 2013).

Besides community participation and access to post bite treatment, the World Health Organisation (WHO) had emphasised on the importance of educational intervention, public awareness and access to mass vaccination of dogs as the main components delineated in the three pillars of a successful rabies control programme (World Health Organisation, 2017). The component of the pillar, such as health educational intervention on rabies-related knowledge, is beneficial for the improvement of knowledge attitude and people's practice towards rabies (Wu et al., 2016). In fact, it should encompass the awareness on the dog's behaviour to prevent dog bite as well as the appropriate response and good health seeking behaviour following a dog bite. As in the paediatric dog bite point of view, children should be competently educated on the dog's behaviour (Asghar et al., 2017) and safe behaviour around dogs (Dwyer et al., 2007) to prevent future dog bites amongst them, besides ensuring the animal control, environmental modifications and optimising the adult supervision (Schwebel et al., 2016).

Rabies outbreak that occurred in Sarawak, Malaysia resulted in 12 mortalities out of 13 cases, as reported from 30 June 2017 to 21 August 2018 (Abdullah, 2018). A total of 16,070 dog bite cases were reported cumulatively from 1 April 2017 to 1 November 2018 (*Jawatankuasa Pengurusan Bencana Negeri Sarawak,* 2018). This indicated the number of dog bite cases in Sarawak, which is gradually increasing over time, despite the intensive health campaign programmes. This could be due to the ineffective use of information, education and communication (IEC) materials in preventing dog bite. Therefore, to address this problem the study had applied a novel and theoretical-based IEC intervention in developing a mobile game application to prevent dog bites amongst school children. It is highly relevant in this modern

sophisticated era whereby computer, web, portable or console games are played by 97% of teenagers aged from 12 years to 17 years, with 48% of them playing games by using a cell phone or handheld organisers (Lenhart et al., 2008).

In this study, a pilot test was conducted to determine the test-retest reliability and validity of outcome measures, which were knowledge on dog's behaviour, precautionary behaviour around dogs, perceived vulnerability towards dogs and help seeking behaviour following dog bites, as well as to explore game preferences for gamification purposes.

Materials and Methods

Study design and sampling procedure

This was a cross-sectional quantitative study to explore the validity and reliability of a questionnaire. This study was conducted within four months, which was from 10 April 2018 to 31 August 2018. To answer the questionnaires, a total of 178 Grade 7 and Grade 8 students aged between 13 years and 14 years were purposively selected from a secondary school in a rabies infected area. The sample size was decided based on the number of items in the questionnaire, which was 5 respondents per item (Hair et al., 2010). The attrition rate was 19% with a total of 178 respondents included in the final analysis.

Data collection instruments and data collection procedure

A questionnaire was developed based on a questionnaire framework (Launiala, 2009). The questions for assessing knowledge on dog were created based on other information sources (Coren & Hodgson, 2007; the United States Department of Homeland Security, 2016). The items to measure perceived vulnerability towards dogs, precautionary behaviour around dogs and help-seeking behaviour in Section C, Section D, and Section E were adapted based on a questionnaire from another study (Shen et al., 2016) to match with the cognitive level of respondents. The English language version was translated into Malay language by a researcher version. Meanwhile, another researcher translated the Malay language version back to English language. Finally, both researchers compared their English language version for field operation.

During data collection, all respondents were gathered in an allocated school hall with assistance from the school principal in both test and re-test sessions with a ten-day gap in between. The respondents were briefed and guided on the questions in the questionnaire through presentation slides to improve their understanding and projected some clearer pictorial items in the questionnaire on a big white screen. This is important to prevent the respondents from any misleading or misunderstanding of the question and reduce the risk of having questions left unanswered due to uncertainty. All data were verified by the research team leader. The content validation was performed by Professor Dr. Razitasham Binti Safii (Public Health Physician) and Dr. Rosalia Saimon (Preventive Scientist).

Data entry and analysis

The data collected were coded, manually checked for any inconsistencies, duplications or missing values and analysed by using the statistical package for social science (SPSS), Version 21.0. Data distribution normality and outliers were examined prior to the descriptive analysis on all five questionnaire sections. Quantitative data were presented in mean, median, minimum, maximum and standard deviation, whereby the qualitative data were presented in frequency and percentage. The reliability of Likert Scale items, namely Section C and Section D, were analysed by using Cronbach's alpha values, and followed by factor analysis by using varimax rotation method for questionnaire validation. The expected Cronbach's alpha to establish reliability was at least 0.70 (University of California Los Angeles, 2020). The intra-class correlation coefficient analysis was also performed to determine the reliability from test-retest and the expected value, which was at least 0.75 to indicate a good or excellent reliability (Koo & Li, 2016). However, in this study Section B and Section E only had content analysis performed.

Ethical considerations

This study was approved by the Ethical Committee of Universiti Malaysia Sarawak (UNIMAS) [UNIMAS/NC-21.02/03-02 Jld.2 (122)]. Furthermore, permission to perform this study by involving the secondary school students was obtained from the Malaysian Ministry of Education [KPM.600-3/23-eras (466)] and Sarawak State Educational Department [JPNSW.SKPP.LAT.600-1/1/1 (89)]. The participants were briefed about the purpose of data collection and their voluntary participation was sought. They were also assured of data confidentiality. A written informed consent was taken before the interview.

Results

Sociodemographic Data

There were 55.6% and 44.4% of respondents aged between 13 years and 14 years, respectively, in which 36% were males and 64% were females. Most of them were Bidayuh ethnic (79.2%), followed by Chinese (10.1%), Iban (7.9%), Malays (2.2%) and other ethnics (0.6%).

Content Analysis

Content Analysis was performed based on the feedback from an expert and the respondents. The choice of answer for question on respondents' ethnic should be rephrased by allowing the respondent who chose "other ethnic" to specify their ethnic. Furthermore, questions on informing parents about dog bite incidence and seeking treatment from a clinic or hospital following a dog bite incidence, which involve the respondent and/or their other family members, should be rephrased by adding the phrase of "or any other adults" instead of mentioning the respondent only. This is important to reduce confusion amongst respondents.

Table 1: Summary of Content Validation

Section	Name of section	Item Removed / Added / Rephrased						Item accepted
		Removed answer	**Removed question**	**Added answer**	**Added question**	**Rephrase answer**	**Rephrase question**	No changes
A	Respondents Information	0	0	0	0	1	2	11
B	Safety Knowledge On Dogs' Behaviour	0	0	0	0	0	0	6
C	Perceived Vulnerability Towards Dogs	0	0	0	0	0	0	11
D	Precautionary Behaviour Around Dogs	0	0	0	0	0	0	8
E	Help-seeking Behaviour Following Dog Bite	0	0	0	0	0	0	5

Reliability Analysis

The overall Cronbach's alpha was 0.796, which showed a good reliability. The individual reliability of both Section C and Section D were also good with Cronbach's alpha of 0.732 and 0.724, respectively. Therefore, no question was removed in view of the good Cronbach's alpha.

Table 2: Reliability Analysis of Likert Scale Items in Questionnaire

Section	**No. of questions**	**Likert Scale**	**Cronbach's alpha**	**Interpretation of Cronbach's alpha**
C	11	5	0.732	Good
D	8	5	0.724	Good
Overall	19		0.796	Good

Test-retest reliability

The intra-class correlation coefficient (95% confidence interval) for questions on perceived vulnerability towards dogs and precautionary behaviour around dogs were 0.842 (0.804 – 0.875) and 0.812 (0.766 – 0.852), respectively. Table 3 summarises these findings.

Table 3: Intra-class Correlation Coefficient of questions on perceived vulnerability toward dogs (Section C) and precautionary behaviour around dogs (Section D)

	Average Measures	*p*	F test value	*95% Confidence Interval*	
				Lower Bound	Upper Bound
C1*	0.753	0.000	4.094	0.666	0.818
C2*	0.754	0.000	4.206	0.664	0.820
C3*	0.634	0.000	2.721	0.504	0.729
C4*	0.611	0.000	2.732	0.457	0.719
C5*	0.746	0.000	3.918	0.656	0.812
C6*	0.693	0.000	3.263	0.585	0.773
C7*	0.661	0.000	3.001	0.541	0.749
C8*	0.672	0.000	3.033	0.555	0.757
C9*	0.678	0.000	3.797	0.420	0.804
C10*	0.746	0.000	3.925	0.656	0.812
C11*	0.658	0.000	3.049	0.530	0.750
Overall C	0.842	0.000	7.239	0.804	0.875
D1*	0.789	0.000	4.714	0.714	0.844
D2*	0.736	0.000	3.810	0.643	0.805
D3*	0.725	0.000	3.682	0.629	0.797
D4*	0.708	0.000	3.440	0.605	0.784
D5*	0.642	0.000	2.816	0.516	0.735
D6*	0.707	0.000	3.412	0.604	0.783
D7*	0.632	0.000	2.707	0.501	0.728
D8*	0.673	0.000	3.058	0.557	0.758
Overall D	0.812	0.000	5.979	0.766	0.852

** Refer Table 4 for full description*

Validity

Exploratory factor analysis was performed for Section C and Section D Likert scale type of questions to explore the interrelation amongst variables in a set of variables. The exploratory factor analysis method used in this pre-test was principal components analysis (PCA). Variables that were correlated with one another but largely independent of other subsets of variables were combined into factors.

Principal components analysis for Section C revealed the presence of two components with eigenvalues that exceeded 1, explaining 27.657% and 10.916% of the variance, respectively. The two-component rotated solutions explained a total of 38.572% of the variance, with Component 1 contributing 19.841 % and Component 2 contributing 18.731 %. The interpretation of the two components was described as perception on ability to approach dogs safely, loading strongly on Component 1 and perception on invulnerability from dog attack, loading strongly on Component 2.

The analysis of Section D revealed the presence of two components with eigenvalues that exceeded 1, explaining 35.664% and 13.149% of the variance, respectively. The two-component rotated solutions explained a total of 48.813% of the variance, with Component 1

contributing 31.174% and Component 2 contributing 17.639%. The interpretation of the two components was described as behaviour upon approaching near a dog, loading strongly on Component 1 and behaviour without approaching near to dog, loading strongly on Component 2.

Table 4: Exploratory Factor Analysis of Section C and Section D

	Section C	Section D	
Kaiser-Meyer-Olkin Measure of Sampling Adequacy	.711	.780	
Bartlett's Test of Sphericity (Sig.)	.000	.000	
Rotated Component Matrix			
Section C		Component	
		1	2
If my dog is sleeping deeply, I can touch or pet my dog without bothering it		.743	
I can play a bit harder or wrestle with my dog if it seems to be enjoying it		.694	
I can pet my dog while it eats as a reward for its good behaviour		.594	
I can play harder with dogs if I have just got vaccines of rabies		.550	
When mother dog is present, I can safely play with its puppies if I play gently		.525	
I think the dog in my own family is less likely to bite people than the average dog			.770
As long as the dog does not see me, I can safely approach the dog from behind			.650
I don't think I would ever be bitten by a dog			.595
I can run faster than unknown dogs so as to avoid them from biting me			.524
My dog knows me very well, so it would never hurt me in the future			.449
I can shout loudly to scare a dog away when it is coming towards me			.325
Section D		Component	
		1	2
How often do you pet a sleeping dog?		.820	
How often do you pet an eating dog?		.719	
How often do you approach a dog from behind?		.565	
How often do you play aggressively with a dog or wrestle with it?		.561	
How often do you play with puppy dogs when their mother is present?		.550	
How often do you approach a dog from front side?		.544	
How often do you yell at a dog?			.807
How often do you provoke a dog intentionally?			.698

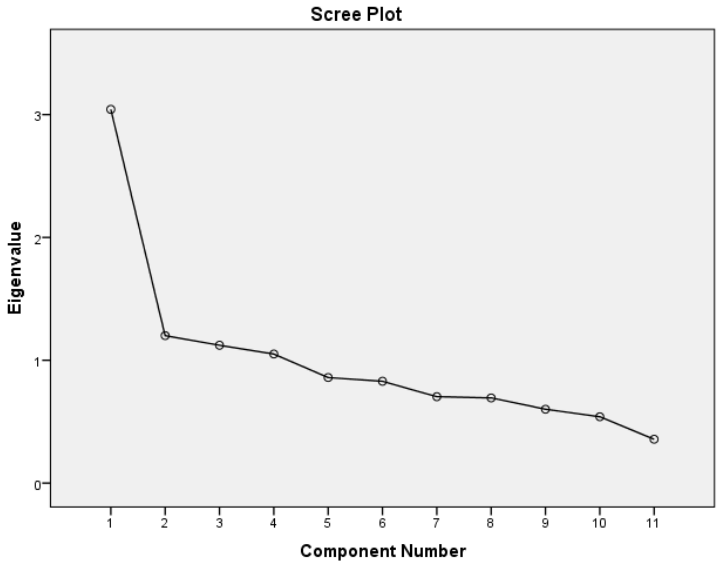

Figure 1: Scree Plot for Section C (Perceived vulnerability towards dog)

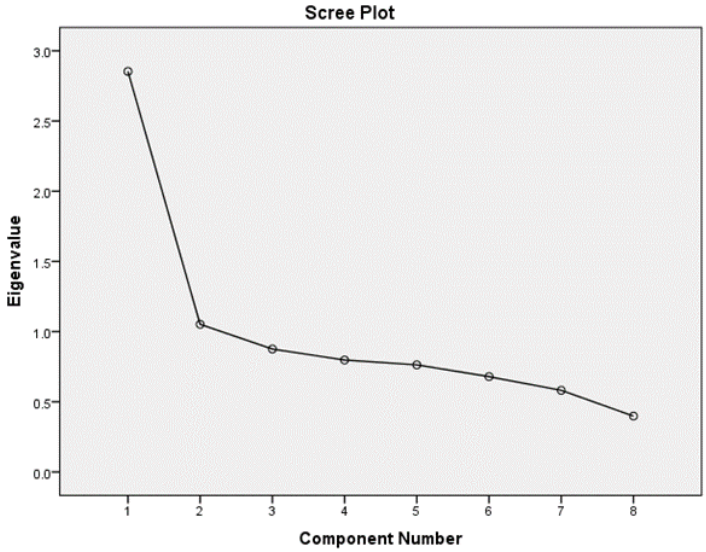

Figure 2: Scree Plot for Section D (Precautionary behaviour around dog)

Discussion

This pre-test study was to assess the validity and reliability of the questionnaire before its usage in the actual study. The respondents involved in this study were different from the actual study to avoid biasness in the latter (Hassan et al., 2006). The adaptation of questionnaire required a good understanding amongst the targeted population, which was vital for maintaining the actual study to be significantly relevant and reliable. The Malay language translated version of questionnaire was highly recommended to be distributed amongst respondents. This was agreed in consideration of the Malay language as the communication language in schools and

generally most students understand the language rather than the other languages. The selection of language was crucial to encourage truthfulness and sincerity amongst respondents in answering the questionnaire. Nevertheless, the concept within the translated questionnaire was kept equal to its original version. This approach was similar to a study in Norway (Gjersing et al., 2010).

Furthermore, the systematic approach of explanation about the research with clear explanation by the researcher on each question and answer in the questionnaire through the presentation slides helped to improve the respondents' understanding of the questions and answers provided. The effort to project some clearer pictorial items in the questionnaire on a big white screen assisted the respondents to understand the questions because the printed photos in the questionnaire were not sufficiently clear. The flow of questions and division of sections were appropriate. Respondents were also required to follow a step-by-step method in answering questions, which were guided and led by the researcher through the presentation slides. This helped all respondents to understand the questions and answers provided in the questionnaire better and were able to answer each question timely. This had reduced the risk of allowing any questions being left unanswered due to uncertainty. Moreover, this method had minimised the risk of overconsumption in time taken for the session. The session was held for about 45 minutes, which was appropriate as the students may lose concentration if longer time was taken and subsequently may result in an inaccurate response.

The sitting position amongst respondents were adequately arranged to prevent any discussion or copying of answers. This encouraged them to answer the questions sincerely and truthfully. Furthermore, the accompanying teachers were seated at a few corners in the hall, which were far from the respondents. Therefore, the respondents may answer the questions freely without pressure or emotional distraction that may be developed due to the presence of teachers near them. All precautionary measures had contributed in reducing biasness in response.

All questions in the questionnaire were based on the objective of the actual study. The accuracy of translation was ensured by back-to-back translation from English language to Malay language that was validated by a preventive scientist and a public health physician. The coding system was also well organised and made the questionnaire easy to understand.

The reliability was good with Cronbach's alpha of more than 0.7 (University of California Los Angeles, 2020). Moreover, it was found that the intra-class correlation coefficient of questions on perceived vulnerability towards dogs in Section C (ICC = 0.842; 95% CI 0.804 -0.875) and precautionary behaviour around dogs in Section D (ICC = 0.812; 95% CI 0.766 -0.852) indicated good values (Koo & Li, 2016). Both sections used a five-point Likert scale with different types of answer. The former assessed on the agreement of the statement, whereas the latter assessed on the frequency of performing certain behaviours. The result of intra-class correlation coefficient for both sections suggested that participants were consistent in answering the questions, even though the gap between the two same tests was 10 days.

Although the result of this pre-test study was reliable and valid, extra precaution was needed in the actual study, especially on the explanation of each and every question, as well as the choice of answers to ensure the respondents were able to understand them and subsequently answer all questions accurately. Generally, the result of this pre-test study had provided some ideas about the possible results to be obtained in the actual study.

The main strength of this study was that interviewer-assisted interview method was done by interviewers by using the national language that could be easily understood by the respondents. This helped in engaging a good rapport with the respondents for a more reliable response. The respondents were also interviewed in their schools which further facilitated better and non-threatening response with full cooperation from the school administration

Conclusion

The method of conducting of the pre-test study can be possibly applied in the actual study as it had created many significant advantages towards accuracy, validity and reliability of result. Therefore, the questionnaire used for the pre-test purpose was found to be suitable and appropriate for the data collection procedure in the actual study, following minor adjustment. The game application can be invented based on the interest amongst the population within this age groups so that it may give a positive impact in achieving the objective of the actual study, which was to prevent dog bites amongst school-aged children.

Conflicts of Interest

This research has no conflicts of interests

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