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Development and validation of a questionnaire assessing the knowledge, attitudes and practices of young adults in Malaysia towards sugar sweetened beverages

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ABSTRACT

The objective of this study is to produce a validated and reliable questionnaire that can assess the knowledge, attitudes, and practices (KAP) of Malaysian young adults towards sugar-sweetened beverages (SSB). Content validation was done using I-CVI and face validity index (FVI) was used to performed face validation. Construct validity was examined using Exploratory Factor Analysis. Cronbach's Alpha (α) was established to determine internal reliability and Pearson Correlation (PCs) was used to measure inter-rater reliability of the items. The settings include three public universities in Klang Valley, Malaysia. The subjects include experts in Nutrition and Health Sciences and undergraduates aged 18 and above. Our results showed that I-CVI lead to the elimination of one item in the attitude domain and all items obtained satisfactory levels of FVI. The measurement of α lead to the elimination of several items and PCs indicated excellent inter-rater reliability (r > 0.7; p < 0.05) for all of the remaining items. In conclusion, the evidence on the validity and reliability of a questionnaire to assess KAP on SSB has been obtained. It can now be used among young adults in Malaysia.

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INTRODUCTION

Recent evidence shows that the intake of sugar, specifically in the form of sugar-sweetened beverages (SSB), has increased among young adults (Majid *et al.*, 2016; Amarra *et al.*, 2016). Many factors are thought to be associated with this increase such as globalization, accessibility, environment and peer pressure (Mchiza *et al.*, 2016; Costa *et al.*, 2014). Accordingly, there is a worrying rise in the prevalence of non-communicable diseases (NCD) among young adults, and growing evidence suggests that SSB is one of the leading factors contributing to these conditions (Deshpande *et al.*, 2017).

To overcome this issue, the government has played their role by establishing several interventions. These include empowering healthy meals and beverages at educational institutions (schools, universities) (MOE, 2011; Teng *et al.*, 2017), increasing the taxes of sugar and SSB (Nakhimovsky *et al.*, 2016), as well as nutrition and health education in the syllabus and through public education (Vargas-Garcia *et al.*, 2017; Tipton, 2016; Shahril *et al.*, 2013). Despite all of the measures mentioned above, the prevalence of obesity, NCD and even SSB consumption has kept increasing.

Thus, this raises the question of whether the prob-

lem is related to lack of awareness among the population. What is the current knowledge and understanding of SSB among young adults? Therefore, this study aims to produce a reliable and valid questionnaire tool that can assess the knowledge, attitudes, and practices (KAP) of young adults with regards to SSB. This piece of information is critical in order to further develop an intervention program that specifically targets Malaysian young adults.

MATERIALS AND METHODS

Research design

This is a cross-sectional study which involved 3 phases. Phase I was a validation test followed by Phase II, construct validity and reliability tests, and finally, Phase III was the pilot study which consisted of a test-retest analysis. This study was conducted at three different public universities in Klang Valley, Malaysia. The study protocol was approved by the Research Ethics Committee of Universiti Teknologi MARA, Malaysia.

Sampling

The inclusion and exclusion criteria are as follows.

Phase I: For content validation, we included experts who are working in Nutrition and Dietetics or Health Sciences fields and have graduated from the same field for more than 1 year. For face validation, the inclusion criteria were similar to the following phases.

Phase II and III: The inclusion criteria were undergraduate students, aged 18 years and above, literate in the English language.

The exclusion criteria for this study included non-Malaysian citizens and people with cognitive disorders or physical disabilities.

Phase I: Validity test

To ensure the validity of the developed questionnaire, content and face validity testing was conducted. The development of the questionnaire followed these steps: determining the constructs of domain content for each domain, item generation, content validation by expert panels, face validation by the target group (undergraduate students), construct validation and finally, pilot study. Item generation was done by a comprehensive literature review and discussion with the research team.

A minimum of five experts were required for this test (Zamanzadeh *et al.*, 2015). The experts consisted of lecturers in nutrition and dietetics, dietitians/nutritionists, and public health experts. They were given a maximum of two weeks to complete the

evaluation. The evaluation was based on the item content validity index (I-CVI). The scale ranged from 1 (not relevant) to 4 (very important). Scale 1 and 2 were classified as not relevant which is equal to zero agreement, meanwhile, scale 3 and 4 were classified as relevant items and signified agreement with the suitability of the content developed to measure the objectives. A comment section was also provided for any queries. The analysis of I-CVI was done according to the given scale, whereby we divided the total number of agreements with the total number of experts. The cut-off points for this analysis were I-CVI >0.79 as appropriate, 0.70-0.79 as needing revision and <0.70 for elimination (Shi *et al.*, 2012).

For face validation, a total of 15 to 20 subjects were required for this test (Yau *et al.*, 2015b). The subjects had to evaluate the revised questionnaire following content validation. They were given one day to make a subjective evaluation in order to determine the clarity and comprehension of the items in the questionnaire. The first part was an evaluation on the clarity of the terms used in the socio-demographic profile. The second part was an evaluation on the clarity of each questionnaire item. In this section, the subjects were provided with a Likert-scale of 1 (not clear at all) until 5 (very clear). The next part was the evaluation of comprehension of the content with a Likert-scale ranging from 1 (tough to understand) until 5 (very easy to be understood).

In the end, the responses were categorized into 0 (not clear or unable to understand) and 1 (clear or able to understand) to calculate the face validity index (FV-I). The total scores were divided by the number of participants and tabulated in the form of percentages to obtain the universal FV-I. An index of less than 80% was considered as unacceptable and was eliminated or modified accordingly. The revised questionnaire then progressed to Phase II.

Phase II: Construct validity

This phase involved the analysis of items (construct validity) and reliability testing as detailed in other studies (Parsian and Dunning, 2009; Juliana *et al.*, 2018). Construct validity was assessed using the exploratory factor analysis (EFA), whereby the principal component analysis (PCA) was used to generate a scree plot and Eigenvalues ($\geq$1) to decide on the number of factors obtained. A loading of 0.30 or greater was required for each factor (Costello and Osborne, 2005). The varimax rotation was employed to determine the matrix appropriateness for factor analysis. The measurement of internal consistency was determined through the value of Cronbach's Alpha. The values near 0.7 were con-

sidered as adequate, 0.8 as optimal and closer to 1.0 as the recommended value. Values of less than 0.7 were eliminated. Sample size calculation was done according to the rule of thumb (Costello and Osborne, 2005), which required 5 subjects per item, equivalent to 235 subjects. Finally, the Corrected Item Total Correlation (CITC) was used to determine the total score and correlation between the items. The value must be above 0.2 to ensure the reliability of the questionnaire.

Phase III: Test-Retest Analysis

The same subjects in Phase II were contacted to answer a similar questionnaire after 24 to 48 hours. Then, Pearson correlation analysis was performed to determine the correlation between the variables. In order to signify a good correlation between the variables, the value must achieve r>0.7.

RESULTS AND DISCUSSION

Phase I: Validity test

The developed questionnaire consisted of a 48-item self-administered questionnaire that used a dichotomous-scale (Yes/No and Agree/Disagree). This smaller scale was decided upon because it is convenient, easier and does not require much time to complete. It was written in the English language as English is the second common language in Malaysia. The 48 items were divided into three domains which are Knowledge (K), Attitude (A) and Practice (P) domains. The domain of knowledge consisted of 25 items; the domain of attitude had 10 items and domain of practice had 13 items. A total of 15 experts responded completely to this content validation test. Based on the I-CVI analysis, we had eliminated one question in the Attitude domain (A3) as it had obtained a score of 0.47. All other questions were appropriate and remained as they were.

In face validation, a total of 20 panels consisting of undergraduates from the Faculty of Health Sciences (n=10) and non-Health Sciences faculties (n=10) were involved. Based on the results, only one respondent commented on the component of demographic data, while others had no issues on that part. After discussing with the research team, that comment was not considered for modification. For KAP parts, the FV-I score achieved targeted values which were 98.4% for the knowledge domain, 99.3% for the attitude domain and 100% for the practice domain. Therefore, modifications with regards to clarity and comprehension were not needed. For the aspect of the overall structure, there was a need to change the font size from size 11 to size 12.

Phase II: Construct validity

The EFA has shown that all domains achieved sufficient factor loading of above 0.30, indicating significant factorial contribution. The average factor loading of the attitude and practice domains were reported as 0.72 and 0.79. The reliability analysis showed that the value of Cronbach's Alpha for each KAP domain was appropriate at 0.733, 0.737 and 0.742. After eliminating the unreliable items, the number of items left for each KAP domains were 10, 5 and 5 items each. The CITC value obtained was more than 0.2, and it indicates an appropriate value to determine the stability of the items. Table 1 presents the value of Cronbach's Alpha and the average CITC for each domain.

Phase III: Test-Retest Analysis

Table 2 shows the socio-demographic data of the subjects. A total of 235 subjects with a mean age of 21.1 $\pm$2.22 years were involved. Based on the findings, all of the items had achieved the desired value which indicates the reliability of the items. The average values of the Pearson Correlation Coefficients (r) for the KAP domains were 0.986, 0.973 and 0.988. In addition, all of the p-values obtained for each item in the domain of knowledge were less than 0.05. This shows significant correlation levels. Table 3 presents the inter-rater reliability results. The increase in the prevalence of being overweight and obese among young adults is worrying. There is growing evidence that this increase is strongly related to the high consumption of sugar-sweetened beverages (SSB) amongst this demographic group. To our best knowledge, there are no published studies in Malaysia that have examined the KAP of SSB among young adults. Previous studies in western countries have shown that the level of KAP with regards to SSB was low and this is parallel with the high intake of SSB (Park *et al.*, 2019, 2014).

This developed questionnaire has been thoroughly validated by following a standard protocol of validation used by studies. The final questionnaire has a total of 20 items grouped into three domains consisting of a dichotomous scale (Yes/No or Agree/Disagree). The items in the knowledge domain were constructed based on facts related to the nutrition of SSB. The effects of frequent consumption of SSB on the development of diseases were also incorporated into the questionnaire items. The attitude domain covers the aspect of identifying awareness on consuming SSB on a daily basis as well as healthy behaviors in the selection of SSB. Lastly, the items in the practice domain were developed based on behaviors or actions that have been implemented and practiced whenever selecting and

Table 1: Corrected-item total correlation and Cronbach's alpha coefficient

No.	Items	Corrected-item total correlation (CITC)	Cronbach's alpha
Domain: Knowledge			0.733
K4	WHO recommends reducing the intake of simple sugar to less than 10% of total energy intake per day.	0.232	
K5	Intake of SSB is considered an appropriate strategy for increasing caloric intake in individuals with inadequate energy intake.	0.333	
K8	Dextrose is the scientific name of simple sugar.	0.403	
K12	15 g (1 tablespoon) of sugar is equivalent to 15 g of carbohydrate in our diet.	0.563	
K13	Calories provided by 1 tablespoon of condensed milk is equivalent to half tablespoon of sugar.	0.481	
K14	A glass of less sweetened Teh Tarik is equivalent to 2 teaspoon of sugar.	0.274	
K19	Beverages with corn syrup stated in the list of ingredients classified as SSB.	0.411	
K20	SSB includes beverages with added honey.	0.358	
K21	Fresh fruit juices is classified as SSB.	0.320	
K22	Plain malted chocolate drinks are classified as SSB.	0.535	
Domain: Attitude			0.737
A1	It is important to read the list of the ingredients before choosing packed beverages in the market.	0.332	
A3	Consumers must know on how to read the label of foods or beverages especially with added sugar.	0.426	
A4	Choosing beverages without added sugar is much healthier compared to SSB.	0.673	
A5	Consumer should aware of other names of sugar that often added in food.	0.417	
A8	I need to have a good knowledge on reading the nutrition facts before choosing or buying foods or beverages in the market.	0.673	
Domain: Practice			0.742
P2	I often identify the amount of sugar added in my drinks before consume.	0.404	
P6	I often select flavoured milk compared to fresh milk.	0.380	
P10	I usually consumed SSB only for breakfast.	0.313	
P12	I often compare the calorie contributed by the sugar added for each beverage before buying the item.	0.529	
P13	I usually consume 3 In 1 beverage as it is easy to prepare and convenient for my daily schedule.	0.386	

Table 2: Characteristics of the subjects (n=235)

Subjects' characteristics	Frequency, n (%)	Mean (SD)
Age (years)		21.10 (2.22)
Adolescents (≤19 years old)	79 (33.8)	
Young adults (≥ 20 years old)	156 (66.4)	
BMI (kg/m^2)		
Underweight	23 (9.7)	
Normal	143 (60.9)	
Overweight	63 (27.0)	
Obese	6 (2.4)	
Gender		
Male	114 (48.4)	
Female	121 (51.6)	
Race		
Malay	120 (50.9)	
Chinese	51 (21.8)	
Indian	46 (19.7)	
Others	18 (7.6)	
Education attainment		
Foundation	52 (22.1)	
Diploma	55 (23.2)	
Degree	128 (54.7)	
Current year of study		
Year 1	62 (26.3)	
Year 2	46 (19.4)	
Year 3	74 (31.5)	
Year 4	54 (22.8)	
Faculty		
Health sciences	102 (43.6)	
Non-health Sciences	133 (56.4)	

Table 3: Test retest analysis

Domain Knowledge	
K4	0.970**
K5	0.981**
K8	1.000**
K12	0.982**
K13	1.000**
K14	0.962**
K19	1.000**
K20	0.991**
K21	0.970**
K22	1.000**
Domain Attitude	
A1	0.939**
A3	0.957**
A4	1.000**
A5	0.980**
A8	0.991**
Domain Practice	
P2	0.992**
P6	0.991**
P10	1.000**
P12	0.991**
P13	0.966**

**correlation is significant at the 0.001 level (p-value)

preparing beverages daily. While developing the content, we considered the relevancy and suitability of this questionnaire for young adults in Malaysia. Similar to previous studies (Yau *et al.*, 2015a; Chen *et al.*, 2013).

Development was based on an extensive review of literature and input from the experts in the research team. The dichotomous scale chosen made the selection of answers clearer and easier as only two answer options were available (Revilla *et al.*, 2014). In addition, this type of scale has been reported to be less time consuming as it limits the confusion that usually happens when answering Likert-scale questionnaires. The content was constructed in a consecutive manner from general nutrition to more specific nutrition. In the knowledge domain, all nutrition information was known facts. Therefore, this domain was not undergone factor analysis (EFA) (Trochim and Donnelly, 2001).

In content validation, it is important to choose the relevant experts to minimize bias. Based on our findings, we evaluated the feedback from experts and modified the questionnaire accordingly. The modification, including the elimination of inappropriate items, is necessary to produce a valid questionnaire. To ensure its reliability, other than measuring factor analysis and internal consistency, the test-retest analysis also provides an impactful platform to measure the agreement between two dichotomous ratings (Hallgren, 2012). In this study, high correlations were achieved in all of the final items, thus proving that this tool is valid and reliable to measure the area of study.

CONCLUSION

The newly developed questionnaire of KAP on SSB was well validated by the target group. Minor modification with respect to content and appearance were done based on the recommendations by

experts and subjects. This tool has the potential to measure the level of KAP on SSB, especially among young adults. Furthermore, it will serve as a baseline to tailor interventions needed in combating the issues perpetuated by increased SSB consumption. Further study on predictive or criterion validity, correlates with the SSB consumption are needed.

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