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Validity and Reliability of 'Fit for Future' Module towards Weight Management Programme among Malaysian Adults

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Abstract
Introduction: This study aimed to develop and evaluate the 'Fit for Future' (F4F) Module for the weight management programme among Malaysian adults. **Methods:** Two different forms of the questionnaire were designed. One form (32 questions) determined content validity, while another form (38 questions) determined inter-item and test-retest reliabilities. **Results:** Contents of the module were improvised accordingly as experts provided qualitative feedback. The CVIs, Cronbach's alpha and intraclass-correlation coefficient (ICC) recorded values of 0.80 and higher, 0.80-0.97 and 0.61-0.91, respectively. **Conclusion:** This study showed that the developed F4F Module has good content validity and reliability and helps Malaysian adults manage weight.

Keywords: Weight management; module; validity; reliability

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1.0 Introduction

1.1 Research Background

In Malaysia, specifically, using the data obtained from the National Health and Morbidity Survey (NHMS) 2015, overweight and obesity prevalence among 18 years old Malaysians increased by 0.6% and 2.6%, respectively, from the last report of NHMS 2011. Various modules and programmes later turned into modules have been developed to curb this issue. Said conducted a study assessing and determining nutritional knowledge, attitude, and physical activity of primary school children to develop a health education module by Said et al. (2020). The study tested these children's knowledge of which food contains high fat and sodium, high sugar, high carbohydrate, high protein, and calcium and dairy products.

A physical activity (PA) education module was used in CEria Respek Gigih Aktif Sihat (CERGAS), an obesity intervention programme targeting adolescents in Malaysia. The programme is proposed to enhance adolescents' knowledge from two secondary schools in Kuala Lumpur on PA and encourage them to engage in PA (Lau et al., 2019). The programme took 90 minutes per session, twice weekly over

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12 weeks after school hours. A similar pattern is that some only focus on underage obesity. Obesity modules are either made based on incorporating one method of managing weight or mixed methods. Therefore, this study aims to validate a new module, "Fit for Future", toward a weight management programme for future use of Malaysian adults. Besides, to test for its reliability amongst Malaysian adults.

2.0 Literature Review

2.1 Weight Management

Nowadays, there are many diets to practice; they are either supported by scientific evidence, helping with weight loss or diets with outcomes seen within a short time without a standard dietary recommendation. These diets may include Mediterranean, Ketogenic, and intermittent fasting. Besides focusing on calorie restriction, they differ in macronutrient proportion and eating window. There is also a diet based on manipulating timing termed intermittent calorie restriction or intermittent fasting (IF). IF variations could differ regarding the allowance of small intake during fasting or length and frequency of fasting cycles (Antoni et al., 2017). This diet is similar to the restriction of carbohydrates, where the body switches to using free fatty acids, fat-derived ketone bodies, and non-hepatic glucose as energy sources, eventually reducing weight. Regardless, Hutchison et al. (2019) found that the combination of calorie restriction (<30% energy requirements) and IF resulted in greater weight reduction over IF alone in a direct comparison of 88 participants over eight weeks. Modifications to the diets help produce weight loss results in the long future by considering the preferences of obese people, allowing better compliance to the diets. In the end, a healthy balance of macronutrient proportion on the plate is suggested rather than diets based on the manipulation of macronutrient content (i.e., low-carbohydrate diets [LCDs]), diets based on the restriction of specific foods or food groups (i.e., Med diets), and diets based on the manipulation of timing (i.e., IF), because often people who are dieting will gain weight even more once they stop dieting.

2.2 Physical Activity

One of the recommended principal components of lifestyle intervention for weight management (Webb & Wadden, 2017) is a typical prescribed physical activity of 150-180 minutes weekly, such as brisk walking or other types of aerobic exercise with moderate intensity. In short-term effects, doing PA alone primarily improves cardiovascular problems rather than helps lose weight. However, the STRIDE Study concluded that a greater weight reduction resulted from a greater PA dose (time). Besides, reducing abdominal adiposity by doing PA seems more important than solely focusing on reducing weight for obese patients. It is encouraged that PA is coupled with an energy-restriction diet because the dose of PA does not work every time. After all, even overexercising leads to other problems; dehydration, fatigue, and confusion. Studies for PA motives showed health was ranked fourth, while well-being shared the fifth rank with stress management out of 12 motives (Baillot et al., 2021). This ranking may reason that PA alone would not be applicable to help people lose weight, and thus adherence to it might be low.

2.3 Dietary Module

Some additional improvements can be put together for a better and more comprehensive dietary module. For example, remote technology has great potential for managing obesity through digital video discs (DVDs) and phone calls. A commercial intensive lifestyle intervention program is also proposed (Ahearn et al., 2017). Nevertheless, too many interventions and goals for obese and overweight patients who struggle to lose weight and hinder other comorbidities like T2DM, cancer, and cardiovascular disease (Bray et al., 2017) in a module would probably make them lose interest in compliance while joining any obesity preventive programmes.

3.0 Methodology

3.1 Research Design

This study's research design is a quantitative study. The development and evaluation of the 'Fit for Future' Module were performed over three phases: module development, content validity and reliability consecutively. In the content validity phase, selected experts from the Ministry of Health Malaysia (MOH), the University of Malaya Medical Centre (UMMC), and the Centre for Dietetics Studies, Universiti Teknologi MARA (UiTM) validated the module content. Next, the reliability phase was conducted to assess the inter-item reliability and test-retest reliability of module items. The target respondents (expert panels and the public) met pre-established criteria before participation. The content validation form and reliability questionnaires were distributed online via Email and Google Forms.

3.2 Study Location

This study took place among respondents living across Malaysia with segregations; accordingly, the northern region (Perlis, Kedah, Penang, Perak), east coast region (Kelantan, Terengganu, Pahang), central region (Selangor, Federal Territory of Kuala Lumpur and Putrajaya), southern region (Negeri Sembilan, Melaka, Johor), and Sabah, Sarawak and Federal Territory of Labuan.

3.3 Sampling

With the recommendation of considerably sufficient five to 10 experts (Gilbert & Prion, 2016), however, a larger sample (n = 18) was invited to content validate the module. The sample size for reliability tests was calculated using a web-based sample size calculator (Arifin, 2017). The minimum acceptable ICC (ρ0) expected ICC (ρ1), significance level (α), statistical power (1–β), number of repetitions per subject (k), and expected dropout rate were set as 0.61, 0.81, 0.05 (two-tailed), 80%, 2, and 20% respectively. The sample size without the 20% dropout rate is 46, while the dropout rate is 58. The data collection process started in April 2022 and continued until June 2022. The validity

and reliability phases each took two months to complete. Content validation forms and reliability questionnaires were distributed to expert panels and participants through online platforms, i.e., Email and WhatsApp.

3.4 Content Validity

Content validity was carried out for this study. The rating scale of relevance is as recommended by Yusoff (2019) on a scale (1 for "not relevant", 2 for "somewhat relevant", 3 for "quite relevant", and 4 for "highly relevant"), considering each item appropriateness, ambiguity, and accuracy. Before the calculation, a relevance scale of 3 or 4 was recorded as 1, while a relevance scale of 1 or 2 was recorded as 0.

The result for content validity was determined using Lawshe's (1957) and, Noah and Ahmad's (2005) content validity index (CVI). The CVI was calculated using the adapted formulae as shown below. The essential items were within the relevance score of 3 or 4.

$$\boldsymbol{Lawshe\ Content\ Validity\ Ratio\ (CVR)} = \frac{N_e - (N/2)}{(N/2)}$$

Where N_e is the number of experts who reported an item as essential; N is the number of experts who provided feedback.

$$\boldsymbol{Lawshe\ Content\ Validity\ Index\ (CVI)} = \overline{x}$$

Where $\overline{x}$ is the mean CVR of all retained items.

Figure 3.1 Lawshe's formula

$$\left(\frac{Mean\ score\ from\ expert\ panels}{Maximum\ Likert\ score}\right) \times 100 = Module\ Content\ Validity(\%)$$

Figure 3.2 Adapted Noah and Ahmad's formula

Lawshe provided minimum valid CVR values for expert panels of five up to 40. Items with valid CVRs or not (somehow supported by experts' qualitative feedback) were retained. Overall content validity was based on CVI. The content validity of this module was much more emphasised on CVI than CVR because Lawshe's formula was based on questionnaire items. Unlike a module, it was based on a whole instrument. By this statement, Noah and Ahmad's formula was also used. According to Lau and associates (2018), regarding Abdollahpour et al. (2010), judgment on each item was made that; the item with CVI higher than 0.79 was deemed appropriate; the item with CVI between 0.70 and 0.79 needed revision; and the item with CVI lower than 0.70 was eliminated. The quickest feedback was received when the content validity was evaluated by meeting online with the experts rather than sending the form through e-mail and waiting for their feedback for a few days and weeks.

3.5 Reliability

Inter-item reliability using Cronbach's alpha determined the internal consistency (how well items within each domain correlated with each other). Consistent participants' scores for items within a domain were deemed appropriate construct representation. There are five inter-item reliabilities interpretation (<0.50 = unacceptable, 0.50-0.59 = poor, 0.60-0.69 = questionable, 0.70-0.79 = acceptable, and >0.80 = good). Cronbach α was calculated at time 1 for each domain and the questionnaire.

To prevent participants from remembering previous responses to questionnaires, a 2-week time frame between time 1 and time 2 tests was considerable. Mean dietary scores were calculated at times 1 and 2 for each domain and the questionnaire. Responses to at least half of a domain's items were included in the mean. Data from participants who responded to both times 1 and 2 questionnaires were included and calculated for ICC. There are five level of agreement; 0.00-0.10 = virtually no agreement; 0.11-0.40 = slight agreement; 0.41-0.60 = fair agreement; 0.61-0.80 = moderate agreement; and 0.81-1.00 = substantial agreement.

3.6 Statistical Analysis

All data were analysed using Statistical Package for Social Science (SPSS) version 22.0 (SPSS Incorporation, Chicago, IL, USA). The normality of the data will be tested using the Shapiro-Wilk test at a 95% significance level. The respondents' socio-demographics will be described using descriptive analysis. Inter-item reliability is calculated by Cronbach α, while Spearmen's correlation coefficient will determine the ICC.

4.0 Findings

4.1 Content Validity Index

Of 18 invited experts, 12 managed to respond and give feedback within a month. The experts are equally divided by gender (50% males & 50% females); the youngest expert is 25 years old, while the oldest expert is 42. The oldest expert holds a master's degree, while the

rest are bachelor's degree holders. Most experts currently live in the central region, followed by one expert living in Malaysia's east coast, northern, and west regions.

Table 1. Content Validity Index (CVI)

Modul	Noah & Ahmad CVI	Lawshe CVI
Modul 1	0.835	0.754
Modul 2	0.86	0.84
Modul 3	0.853	0.792
Modul 4	0.829	0.809
Modul 5	0.847	0.826
Modul 6	0.878	0.879
Modul 7	0.778	0.627
Modul 8	0.827	0.819
Modul 9	0.843	0.872
Modul 10	0.790	0.759
Total	0.830	0.800

4.2 Inter-item and Test-retest Reliability

A total of 55 respondents were gathered in the inter-item reliability phase. Most of them are females (n=33; 60%), while 22 males participate (40%). Participants within age group of 19-25 makes up the most number of respondents (n=42; 76.3%), followed by those age groups of 36-40 (n=5; 9.1%), 31-35 (n=4; 7.2%), 26-30 (n=3, 5.4%) and a participant representing those age group of 46-50 (1.8%). In ascending order of race or ethnicity that took part are Bajau (n=1, 1.8%), Indian (n=1, 1.8%), Iban (n=1, 1.8%), Chinese (n=2, 3.6%) and Malay (n=50, 90.9%). The highest number of participants (n=23, 41.8%) is from the southern region (Negeri Sembilan, Melaka & Johor), while the lowest participants (n=3, 5.5%) are each from the northern region (Perlis, Kedah, Pulau Pinang & Perak) and Sabah, Sarawak and Federal Territory of Labuan. The second highest number of participants (n=16, 29.1%) live in the central region (Selangor, Federal Territory of Kuala Lumpur & Putrajaya). Participants in the east coast region (Kelantan, Terengganu & Pahang) came close with 18.2% (n=10).

Table 2. Inter-item reliability (Cronbach's alpha coefficient)

Sub-module	No. of items	Cronbach's alpha coefficient
1	4	0.880
2	3	0.881
3	3	0.806
4	4	0.844
5	4	0.888
6	4	0.881
7	2	0.803
8	3	0.898
9	3	0.918
10	4	0.950

Table 3. Test-retest reliability (Intra-class correlation coefficient)

Items	ICC, r	p-value
Sub-module 1		
1. Able to know the importance of energy for daily life.	0.876	0.000
2. Able to classify energy balance.	0.844	0.000
3. Able to identify energy expenditure and factors influencing Basal Metabolic Rate (BMR).	0.783	0.000
4. Able to calculate daily energy requirements using formula.	0.840	0.000
Sub-module 2		
5. Able to differentiate between hunger, desire, craving and thirst.	0.849	0.000
6. Able to monitor hunger according to the situation based on a hunger scale.	0.665	0.007
7. Able to change mindless eating to mindful eating.	0.621	0.012
Sub-module 3		
8. Able to identify carbohydrates and its sources.	0.756	0.001
9. Able to calculate daily carbohydrate recommended intake.	0.442	0.082
10. Able to learn carbohydrates exchanges.	0.611	0.015
Sub-module 4		
11. Able to calculate daily water requirements.	0.663	0.006
12. Able to know the importance of water, signs body is lacking water and the effects of excess water.	0.872	0.000
13. Able to distinguish beverages with high sugar content.	0.834	0.000
14. Able to differentiate between facts and myths regarding water intake.	0.686	0.002
Sub-module 5		
15. Able to identify protein and its sources.	0.701	0.004
16. Able to know and calculate daily recommended protein intake.	0.736	0.001

17. Able to learn the importance of protein and the effects of deficient and excessive protein.	0.637	0.007
18. Able to learn protein exchanges.	0.471	0.042
Sub-module 6		
19. Able to define fats and its sources.	0.692	0.003
20. Able to learn the importance of taking fats and the effects of excessive fats.	0.604	0.011
21. Able to learn fats exchanges.	0.461	0.074
22. Able to make use of food exchanges on menu planning.	0.519	0.042
Sub-module 7		
23. Able to learn to make healthy menus.	0.442	0.064
24. Able to practise distraction techniques while dieting.	0.525	0.048
Sub-module 8		
25. Able to identify basic components in the Nutritional Information Panel (NIP).	0.756	0.000
26. Able to differentiate NIP between two products (example: 2 low-fat milks from 2 different brands).	0.604	0.008
27. Able to learn the meaning of food claims on food products.	0.697	0.002
Sub-module 9		
28. Able to define and distinguish fad diet and its characteristics.	0.950	0.000
29. Able to identify risks of practising fad diets.	0.939	0.000
30. Able to identify facts and myths throughout dieting.	0.762	0.000
Sub-module 10		
31. Able to define food supplements.	0.839	0.000
32. Able to learn the examples and forms of food supplements.	0.890	0.000
33. Able to identify individuals recommended to take food supplements.	0.632	0.009
34. Able to know the pros and cons of food supplements.	0.859	0.000

5.0 Discussion

The Lawshe, Noah, and Ahmad methods are considered appropriate and accepted tools to establish the content validity of items and modules. The number of experts that responded to the invitation for content validation exceeded the minimum panel of 5 to 10 experts (Gilbert & Prion, 2016). Individual objective-based questions in the reliability form captured the overall construct of the weight management programme as the multiple questions highly correlated with each other after the inter-item reliability phase. The high ICC scores demonstrated consistency for a given individual due to the form producing repeated objective-based weight management measurements. Improvements were made to the module's content, especially regarding illustrations. However, most studies should have only focused on content appropriateness, ambiguity, and accuracy, as suggested by Yusoff (2019).

CVIs of sub-module 7 were the lowest to the extent supposed to be eliminated. However, this sub-module was deemed appropriate because qualitative feedback from experts indicated it was a component of nutrition and significant to the weight management programme. Most experts suggested learning how to prepare healthy food ingredients and treatment-wise, including more local healthy menus and changing the title of the sub-module. Furthermore, justification for this sub-module inclusion is based on literature stating that the preparation of healthy menus is part of food preparation that goes back to the foundation of knowledge which and how food provides the least and most nutrients (Chong, Appannah & Sulaiman, 2019). Preparing nutrient-dense foods containing complex carbohydrates, high HDL cholesterol, and more vitamins and minerals helps manage weight. Therefore, this sub-module could translate into better diet quality.

A module is considered reliable for which the participants that took part can master the objectives of the intervention (Russell, 1974). Hence, this study chose to design a form of questions based on the F4F Module objectives in each sub-module. The form looked for and determined the internal consistency between items of the same construct or domain. Most sub-modules had four objectives with a minimum of two objectives with Cronbach α higher than 0.80, indicating that responses to all items within similar domains correlated well with responses of that same domains. This showed good inter-item reliability. This module obtained an outstanding overall Cronbach α of higher than 0.90 that passed beyond the minimum acceptable reliability index value of a module that is only applicable to the real settings (>0.60). Even with a suggestion from Hopkins that a module could be accepted only if it achieved Cronbach α of 0.90, this module managed to be in accordance with that condition (Madihie & Noah, 2013).

The test-retest reliability of the F4F Module was determined by the correlation between the first and second administration in the two-week interval. The duration was appropriate for respondents to minimise changes from their first response, as Kennedy et al. (2019) suggested. Besides, the re-test period of 14 days resulted in higher reliability values. 41.8% of the initial respondents participated for the second time (n=23). The result was reported according to Koo and Li (2016) and found that the ICC scores for items on all domains ranged from r=0.442 (slight agreement) to r=0.950 (substantial agreement).

6.0 Conclusion & Recommendations

This study has successfully developed a 'Fit for Future' Module with good and acceptable validity and reliability. Several limitations and recommendations can be made to improve the result and structure of the module. First, the participants in this study were mostly in their 20s and had little feedback from older adults. This might be challenging for future researchers to adopt the module as the age gap may influence and differ the needs and adherence to weight management programmes. Furthermore, the module was tested on participants with a slight briefing and without a certified facilitator. Although it was a pilot study, there is a need for a programme to be carried out to establish the better effectiveness of the module. Future research can improve preliminary and principal component analysis to reduce the items in the form so that a higher number of responses can be achieved faster and conveniently.

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Paper Contribution to Related Field of Study
The findings from this study make a significant contribution to the existing literature and interventions of weight management programmes and modules for adults across Malaysia by highlighting nutrition and PA since most studies were carried out in European countries. The 'Fit for Future' Module was found to be adequately valid and reliable for the weight management program.

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