



Intuitive Eating Behaviour Questionnaire towards Obesity: Precision health perspective

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Abstract

Introduction: Intuitive eating involves consuming food based on internal hunger and satiety cues. This study aims to establish a validated and reliable questionnaire. **Methods:** The questionnaire items' difficulty, uncertainty, and inappropriateness were conducted. The validity is analysed using the Content Validity Index and Lawshe's Content Validity Ratio, estimated by inter-item reliability (Cronbach's Alpha) and test-retest reliability (Intraclass Correlation Coefficient). **Results:** The CVIs correlation coefficient is 0.89 – 0.99. The Cronbach's Alpha coefficient value is 0.66 – 0.68. **Conclusion:** This study showed that the questionnaire has good validity and reliability towards obesity from an intuitive eating behaviour perspective.

Keywords: Intuitive eating; Obesity; Validity, Reliability

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1.0 Introduction

Obesity in Malaysia in 2020 is estimated to be 54.2% of the Malaysian adult population, indicating an increment of 4% from the findings of the National Health and Morbidity Survey (NHMS) 2019. Obesity may not only lead to multiple diseases, such as coronary heart disease, type 2 diabetes, musculoskeletal diseases, and several types of cancers, but it also increases the risk of disability, retirement, and low confidence (Silventoinen & Konttinen, 2019). A study by Ramalho et al. (2021) mentioned that obesity directly correlates with a higher Body Mass Index (BMI), which associates with lower levels of intuitive eating. In addition, adolescent girls are more self-conscious about their appearance and weight, especially overweight adolescent girls. Their strategies to lose weight can vary from healthy to harmful behaviour, such as taking laxatives, diet pills or skipping meals. This harmful behaviour is known as unhealthy weight-control behaviour (Lopez-Guimera, et al., 2012). A longitudinal study by Neumark-Sztainer and colleagues discovered that self-reported dieting behaviour does not always correlate to weight loss or maintenance. Instead, they have found that the subjects have gained weight. Adolescents with unhealthy weight control behaviour were reported to have three times the risk of being overweight after 5 years of follow-up (Lopez-Guimera, et al., 2012).

Previous research has suggested that helping individuals notice and respond to their hunger and satiety cues, which is intuitive eating, may be a healthier alternative to dieting (Denny, Loth, & Neumark-Sztainer, 2013). Popularised by registered dietitians Evelyn Tribole and Elyse Resch, intuitive eating is a non-diet approach to health that started to gain popularity in 1995 (Bas, et al., 2017). Intuitive eating is adaptive eating that encourages people to consume food only when hungry (Godde, Yuan, Kakinami, & Cohen, 2021). People who eat intuitively depend on their bodies' biological hunger and satiety cues to determine when and what food to eat, allowing them unconditional permission to eat and minimising obsession with weight loss (Ramalho, Saint-Maurice, Felix, & Conceicao, 2021). This dieting has been a healthier and more effective alternative weight-loss method, slowly replacing the intentional, restrictive weight-loss plan due to the better psychological and behavioural health that intuitive eaters can possess (Godde, Yuan, Kakinami, & Cohen, 2021).

Precision health approaches require reliable and valid tools to assess individuals' intuitive eating behaviour about obesity. This study aims to evaluate the psychometric properties of a questionnaire designed to measure intuitive eating behaviour, focusing on its validity and reliability from a behavioural perspective. By establishing a robust measurement tool, healthcare providers can gain valuable insights into individuals' eating habits and develop tailored interventions to address obesity.

2.0 Literature Review

2.1 Definition of Obesity

Obesity is derived from the Greek expression *ob-edere*, which means overeating. World Health Organization (WHO) classified an individual as overweight (BMI value: 25.0-29.9 kg/m²) and obese (BMI value: \geq 30.0 kg/m²). Then, WHO (2011) defined overweight and obesity as abnormal or excessive fat accumulation that may interfere with someone's health. Various terms for obesity are used by scholars, such as abdominal obesity, abdominal adiposity, body fat percentage, and predictors for obesity (Ahmad, Ibrahim Mohamed Adam, Mohamed Nawi, Hassan, & Hasanain Faisal, 2016).

2.2 Definition of Precision Health

Precision Health, also known as precision medicine or personalised medicine, is an approach to healthcare that utilises individual-specific information, including genetic, environmental, and lifestyle factors, to guide disease prevention, diagnosis, and treatment strategies. It aims to provide tailored interventions and interventions that are customised to the unique characteristics of each individual, maximising the effectiveness and minimising the risks and side effects of medical interventions (Hekler, Tiro, Hunter, & Nebeker, 2020).

2.3 Obesity in Malaysia

WHO mentioned that obesity had reached epidemic proportions globally, with at least 2.8 million people dying from being overweight or obese (BERNAMA, 2020). National Health and Morbidity Survey (NHMS, 1996) showed Malaysia's prevalence of overweight and obesity as 16.6% and 4.4%, respectively. Malaysian adults' mean BMI was 22.48 kg/m² (Institute for Public Health, Ministry of Health Malaysia, 2019). In the third NHMS in 2006, the national prevalence of overweight among Malaysian adults was 29.1%, and obesity was 14.0% (Institute for Public Health, Ministry of Health Malaysia, 2019). The percentage of overweight adults has doubled, whilst the obese proportion has tripled in Malaysia in less than 20 years.

The prevalence of obesity among females has doubled (29.6%), and this prevalence was also found to be greater than men (25.0%) (Institute for Public Health, 2011). NHMS 2006 and NHMS 2011 found that obesity among women was higher than among men. In addition, the mean BMI among housewives was also higher than in other job categories (Mean BMI: 26.6 kg/m²) (Institute for Public Health, 2011).

A 2011 study by the NHMS among Southeast Asian countries showed that Malaysia surpassed the list with the above-average population of obese adults, at 44.2 per cent. 2015 it shot up to 47.3% (NHMS, 2015). This discouraging situation should be seriously monitored as overweight, and obesity often present together with systemic, low-grade, and chronic inflammation usually associated with various severe diseases (Segula, 2014). The Institute of Health's Second Burden of Disease Study for Malaysia 2012 pulled out hypertension, smoking, diabetes, high cholesterol, overweight, and obesity as the most contributors to disability and mortality. The most recent data shows that 1.65 million schoolchildren are expected to be overweight or obese by 2025 if nothing is done. Malaysians are indeed unhealthy. On obesity, for example, the country's total (direct and

indirect) costs are the highest in ASEAN, accounting for 10-19% of national healthcare spending (Md Sani, 2019).

2.4 Intuitive Eating Behaviour

Intuitive eating behaviour involves eating food through internal hunger and satiety (Tylka & Kroon Van Diest, 2013). It is characterised by a strong tangible connection to the body and a common obsession with food (Tribole & Resch, 2012). Intuitive eating is primarily measured by the Intuitive Eating Scale-2 (IES-2) (Tylka & Kroon Van Diest, 2013). The IES-2 covers four different domains of intuitive eating. The first one is 'Unconditional Permission to Eat' (UPE), which reflects the behaviour of eating whichever foods are desired. Foods are not categorised into allowed and forbidden foods. UPE will enable people to eat unconditionally, making them less likely to overindulge in food (Tribole & Resch, 2012).

Meanwhile, 'Eating for Physical Rather Than Emotional Reasons' (EPR) measures the capability to eat when physically hungry rather than using food to deal with negative feelings. EPR indicates an eating style that is not influenced by affective states. 'Reliance on Hunger and Satiety Cues' (RHSC) can rely on hunger and satiety cues to regulate food intake. The perception of physiological conditions is a crucial feature of RHSC. Individuals who do not rely on hunger and satiety cues are more likely to experience weight gain, dietary restraint and emotional eating.

Next is 'Body-Food Choice Congruence' (B-FCC) shows the selection of tasty and healthy nutrition in line with psychical desires. This aspect magnifies intuitive eating, including gentle nutrition honing health and body functioning. B-FCC is the new domain Tylka and Kroon Van Diest (2013) developed from the original 21 items into the new 23-item IES-2 (Tylka & Kroon Van Diest, 2013).

2.5 Weight-Control Behaviour

Weight control management can be correlated with dieting and unhealthy weight-control behaviour (UWCB), which has been common among adolescents, especially overweight girls. The strategies to lose weight among adolescent girls range from healthy behaviour, such as consuming more fruits and vegetables and less and drinking sweetened beverages, to harmful behaviour, such as purging, using laxatives or diet pills, and skipping meals. Unfortunately, the most suitable approach and intervention to reduce this dangerous behaviour related to UWCB are not yet discovered. Most tools used to tackle this behaviour often correlate to eating disorder prevention programs that do not work efficiently. (Lopez-Guimera, et al., 2012).

2.6 Precision Health and Intuitive Eating Behaviour

Precision health aims to individualise healthcare by considering factors unique to each person. This includes genetic variations that may influence an individual's metabolism, response to certain foods, or predisposition to obesity. By incorporating information on an individual's genetic profile and other relevant factors like lifestyle and environment,

precision health interventions can be tailored to address specific needs and challenges related to intuitive eating behaviour.

The integration of precision health and intuitive eating behaviour can significantly affect obesity prevention and management. By identifying genetic predispositions or metabolic factors that influence an individual's eating behaviour, healthcare providers can develop targeted interventions to support and enhance intuitive eating habits. This may involve personalised dietary recommendations, counselling on mindful eating practices, or addressing underlying psychological factors that impact eating behaviours.

2.7 Precision Health and Weight-Control Behaviour

Weight-control behaviour offers valuable insights for precision health initiatives. Researchers and healthcare professionals can better understand the underlying factors contributing to successful weight management or weight loss resistance by studying individuals' behaviours related to weight control. These behavioural insights can inform the development of personalised interventions that address individuals' specific challenges, such as emotional eating, binge eating, or lack of adherence to dietary recommendations. Precision health can leverage this knowledge to design interventions that address individual barriers and support sustainable weight control (Thomas, Bond, Phelan, Hill, & Wing, 2013).

3.0 Methodology

3.1 Research Design

New questionnaires involving weight control behaviour were created during questionnaire development and adaptation. Intuitive Eating Scale-2 (IES-2) from Tylka and Kroon Van Diest (2006) was translated from English to Malay; content validity was done among an expert panel of personnel from senior lecturers, public health nutritionists and academicians. Finally, the reliability phase analysed the questionnaire's inter-item and test-retest reliability. The targeting respondents need to meet pre-established criteria before participating in this study. The questionnaire is meant to be self-administered by the respondents.

3.2 Sampling

The sampling method used in this study is purposive and convenience sampling. For the validity study, the purposive sampling method is used to select the respondent as the inclusion criteria are experts in the nutrition field above 20 years old. It has high English literacy, as the questionnaires will be validated in English. Besides, the exclusion criteria are non-Malaysian citizens and individuals with physical and mental disabilities. The convenience sampling method is used in a reliability study to obtain the data from the respondents. The WHO Southeast Asia Region defines the 'youth' category of respondents ranging from 15 to 24 years old, students from higher learning institutions in Malaysia; the

participants should be free from physical and mental disabilities and understand the English language. The exclusion criteria are illiterate participants without old or unstable conditions. For the sample size calculation, a minimum of 10 experts panel was determined to evaluate both sets of questionnaires during the validity study. The sample size calculation for the inter-rater reliability study was calculated using the Intraclass Correlation Coefficient (ICC) hypothesis testing method (Bujang & Baharum, 2017). With the defined parameter of 0.7 for minimum acceptable reliability (R_0), 0.9 for expected reliability (R_1), two-tailed significant levels, and 2 repetitions per subject (k). Based on the formula, the participant needed for the reliability study is 23.

3.3 Measurement

3.3.1 Validity

The type of validity used in this study is content validity, which indicates the scope of a measurement construct. It is essential to support the validity of the newly developed questionnaire (Yusoff, 2019). The experts rate each item in the questionnaire as “1 = not relevant”, “2 = somewhat relevant”, “3 = quite relevant”, and “4 = highly relevant” in considering the appropriateness, accuracy, and ambiguity of each item in the questionnaire. Before the calculation, the relevance rating will be denoted as 1 (relevance scale of 3 or 4) and 0 (relevance scale of 1 or 2). Then, the result for content validity will be determined using Content Validity Ratios (CVR) and Content Validity Index (CVI). The CVR will be calculated using Lawshe’s formula as shown below:

$$CVR_i = \frac{n_e - \frac{N}{2}}{\frac{N}{2}}$$

Where,

CVR_i = value for an item on the test

n = number of experts indicating that an item is essential

N = total number of experts in the panel

The CVI will be determined on average according to the relevance rating. The definition and calculation of the CVI value are adapted from Yusoff (2019). According to Frey (2018), a CVR value of at least 0.78 is necessary to evaluate the scale’s validity. However, if the items obtain less than 0.78, the thing should be refined or considered for deletion. Before the CVI calculation, the acceptable CVI value for at least 9 experts is 0.78 (Yusoff, 2019).

3.3.2 Reliability

After verifying validities, two varieties of reliability were applied to determine the study’s internal consistency and correlation, including inter-item and test-retest reliability. The Cronbach α coefficient was calculated when 1 respondent answered the questions. A 2-week time frame between tests is applied in this study to collect the data because it is

considered sufficient time for respondents to answer the question without remembering the previous responses. The intraclass correlation coefficient (ICC) was calculated to assess the similar reactions in week 1 and week 2 answering the questionnaires.

3.4 Data Collection

The data collection started in March and continued till May 2022. The validity and reliability phases were conducted for 2 months each to finish the process.

3.5 Statistical Analysis

All the statistical analysis was done using Statistical Package for Social Science (SPSS) version 20.0 (SPSS Inc., 2011), including demographic and reliability data. The normality of the data was analysed using the Shapiro-Wilk test at the 0.05 significance level. Descriptive analysis was applied to describe the socio-demographics. Cronbach's alpha was calculated for the inter-item reliability of the developed questionnaire, and Spearman's correlation coefficient was used to identify the intraclass-correlation coefficient (ICC).

4.0 Results

4.1 Content Validity

The developed and adapted questionnaire is sectioned into 4 parts: socio-demographic background, intuitive eating behaviour, and weight control behaviour (part C) and (part D). The initial questionnaire consists of 52 questions, with 9, 25, 7 and 11 questions for parts A, B, C and D, respectively. The content validity study assessed the questionnaire's acceptance, effectiveness and understanding. The I-CVI value for all the questions is above 0.8, which indicates that the questions are appropriate, and the value of I-CVI and S-CVI/Ave has been achieved. For the CVR of every question, Lawshe's Law formula was used, and the result shows a value of 0.6 and above except for one question (part D).

After all, 10 experts had completed the validity form; the questions were reduced to 49. This is due to experts' recommendations and suggestions to improve the questionnaire to a more suitable one. For the first domain of the questionnaire, Intuitive Eating Behaviour (part B), only one question was eliminated because of repetition. The remaining 24 questions have a high value of CVI and CVR (0.99 and 0.98), so no question was deleted. For the second domain, Weight Control Behaviour (part C), all 7 questions are retained as the CVI and CVR values are acceptable. However, based on experts' suggestions, the questions have been edited to be more specific. Thirdly, for the last domain, Weight Control Behaviour (part D), the questions were reduced to 9. Question number 5 was deleted, and questions 10 and 11 were combined into one question. To conclude, the final draft of the questionnaire consists of 24 items on intuitive eating behaviour, 7 items on weight control behaviour (part C) and 9 items on weight control behaviour (part D).

Table 1: Intuitive Eating Behaviour

Intuitive Eating Behaviour (part B) (5-Likert scale)

Cronbach's alpha coefficient of 0.742

Q1	I try to avoid certain foods high in fat, carbohydrates, or calories.
Q2	I eat when feeling emotional (e.g., anxious, depressed, sad), even when I'm not physically hungry.
Q3	I allow myself to have a certain food if I am craving it.
Q4	I get mad at myself for eating something unhealthy.
Q5	I eat when I am lonely, even when I'm not hungry.
Q6	I trust my body to tell me when to eat.
Q7	I trust my body to tell me what to eat.
Q8	I trust my body to tell me how much to eat.
Q9	I have forbidden foods that I don't allow myself to eat.
Q10	I use food to help me soothe my negative emotions.
Q11	I eat when stressed out, even when I'm not physically hungry.
Q12	I can cope with my negative emotions (e.g., anxiety, sadness) without turning to food for comfort.
Q13	When I am bored, I do NOT eat just for something to do.
Q14	When I am lonely, I do NOT turn to food for comfort.
Q15	I find other ways to cope with stress and anxiety than by eating.
Q16	I allow myself to eat what food I desire at the moment.
Q17	I do NOT follow eating rules or dieting plans that dictate what, when, and/ or how much to eat.
Q18	Most of the time, I desire to eat nutritious foods.
Q19	I mostly eat foods that make my body perform efficiently (well).
Q20	I mostly eat foods that give my body energy and stamina.
Q21	I rely on my hunger signals to tell me when to eat.
Q22	I rely on my fullness (satiety) signals to tell me when to stop eating.
Q23	I trust my body to tell me when to stop eating.
Q24	I stop eating when I feel full.

Table 2: Cronbach's Alpha Coefficient (0.266) of Weight Control Behaviour (5-Likert scale)

Q1	How often have you gone on a diet during the past 12 months?
Q2	How often do you exercise in a month? (i.e., 20 mins, 3 times a week)
Q3	How often do you eat fruits and vegetables in a week?
Q4	How often do you eat less high-fat foods? (i.e., fast food, fried foods, desserts, chicken skin, sausages, and full-fat dairy products).
Q5	How often do you eat fewer candies?
Q6	How often do you eat fewer candies?
Q7	How often do you drink sugary carbonated beverages?
	Do you control your portion size when eating?

Table 2: Cronbach's Alpha Coefficient (0.660) of Weight Control Behaviour (Opt: Yes/ No)

Q1	I'm fasting to control my body weight (i.e., any religious fasting and intermittent fasting)
Q2	I ate very little food.
Q3	I used a meal replacement product (i.e., Shaklee Cinch, Herbalife Formula 1 Meal Replacement Shake Mix, Kitsui Meal Replacement)
Q4	I skipped meals OR ate very little food to control my diet.
Q5	I took diet pills (i.e., slimming products and supplements.)
Q6	I made myself vomit after eating.
Q7	I used laxatives to relieve constipation (i.e., Correctol, Dulcolax, Feen-a-Mint, Senokot).
Q8	I used diuretics to get rid of excess water from the body (i.e., coffee, black tea and green tea.)
Q9	Have you ever over-eaten, most likely your favourite food? (i.e., free-flow lunch buffet, desserts, festive foods, etc.)

5.0 Discussion

Worldwide obesity has nearly tripled since 1975. Over 1.9 million adults were overweight, while 650 million were obese in 2016. However, obesity can be prevented with proper and suitable strategies (WHO, 2021). Adolescent girls are more self-conscious about their appearance and weight, especially overweight adolescent girls. Their approach to losing weight can vary from healthy to harmful behaviours such as taking laxatives, diet pills or skipping meals. This harmful behaviour is known as unhealthy weight-control behaviour (Lopez-Guimera, et al., 2012). A longitudinal study by Neumark-Sztainer and colleagues discover that unhealthy self-reported dieting behaviours do not correlate to weight loss or weight maintenance; instead, they found that the subjects have gained weight. (Lopez-Guimera, et al., 2012). To overcome this issue, intuitive eating behaviour has been a healthy, alternative weight loss method.

When examined from a precision health perspective, the 'Intuitive Eating Behaviour Questionnaire' holds significant potential in obesity management and prevention. Precision health tailors interventions to individual characteristics, including genetic, environmental, and lifestyle factors, to optimise healthcare outcomes. By evaluating intuitive eating behaviours through a questionnaire, healthcare providers can gather valuable insights into individuals' eating habits and develop personalised interventions to address obesity effectively.

The steps in establishing the questionnaires are content development, validation and reliability. This questionnaire was self-administered by experts from a wide range of socio-demographic backgrounds, including multiple levels of education, various economic circumstances and different occupation backgrounds related to nutrition and dietetics. Therefore, the questionnaire to assess the level of intuitive eating behaviour among youth in higher learning institutions in Malaysia is credible as professional experts review it.

The questionnaire content was adapted from Tylka and Kroon Van Diest (2013), where 23 questions of IES-2 were taken and adapted to the Malay language. Then, two domains of weight control behaviour were developed to strengthen the questionnaire concerning the obese youth group.

In the next phase, content validity, 10 experts have been selected. The total number of experts is based on a study by Yusoff, 2019. The minimum acceptable expert number is two; some studies suggest a minimum of 6 experts and, at most, 10 experts (Yusoff, 2019). According to Taherdoost, 2016, the minimum CVR value for 10 experts is 0.62 (Taherdoost, 2016), meanwhile, for CVI, following Lynn, 1986, the minimum accepted value is 0.78 (Yusoff, 2019). For the developed and adapted questionnaire, the CVIs are above 0.89, and the CVR is above 0.77. Thus, the questionnaire's content is valid. All comments and suggestions from the experts have been considered, and the questionnaire has been improved.

6.0 Conclusion

This study established a validated and reliable questionnaire towards obesity from an intuitive eating behaviour perspective. Furthermore, it will be used in data collection in the next study among youth in higher learning institutions in Malaysia. Improve the situation by establishing a validated and reliable questionnaire across all age categories classified by WHO.

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Article Contribution to Related Field of Study

Precision health initiatives require reliable and valid assessment tools to evaluate individuals' intuitive eating behaviour regarding obesity. This study contributes to the field by assessing the psychometric properties of the Intuitive Eating Behaviour Questionnaire, highlighting its validity and reliability from a behavioural perspective. The findings underscore the importance of considering individual eating behaviours when developing precision health interventions to prevent and manage obesity. Future research should focus on further validation of the questionnaire across diverse populations and settings, ensuring its applicability in various healthcare contexts.

Authors Declaration

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