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A SEM-PLS Model Analysis: The Relationship of Health Promotion Model Components and Self Efficacy to Prevent Obesity among Nursing Students.

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ABSTRACT: Obesity is on the rise worldwide and become a global issue. Healthy lifestyle practice is Promotion proven to prevent from obese. Nurses are responsible for promoting a healthy lifestyle. As Model, PLS -SEM, future nurses, nursing students must be prepared to become good role models for practicing healthy lifestyles by having ideal body weight and good body image. In order to maintain their health condition, it is necessary to take preventive measures, one of which is the application of Healthy lifestyle behaviour. In improving the compliance of nursing students as future nurses in improving their health status, it is vital to perform health promotion to the patients and public to improve nation's quality of life. The study aimed to identify and determine the relationship between components in preventing obese among nursing students. The study utilized a cross-sectional design. The study samples were all nursing students from selected Private Healthcare University in Malaysia amounting to 360 respondents, and data were collected by random sampling technique. Data analysis in this study used the SEM-PLS technique, with three stages of analysis: 1.) outer model test, in the form of reflective and formative models, to determine the relationship between indicators and latent variables; 2.) inner model test, consisting of R-squared test (R2), effect size (f2), predictive prevalence (Q2), and Goodness of Fit test. The inner model test aims to determine the relationship between latent variables; and 3.) Hypothesis testing to observe the significance value of the effect of exogenous variables on endogenous variables through the T statistical value (> 1.96)and p-value (<0.05). Finally a total of 348 respondents met the criteria for conducting data analysis.

1. Introduction

Obesity is a contributing factor to the prevalence of several diseases including coronary heart disease or heart attack, hypertension, and diabetes; all these noncommunicable diseases are linked to having a high body mass index (BMI) (Felisbino-Mendes et al 2020). The World Health Organisation (WHO) recommends that people keep their BMI between 18.5 and 24.9 kg/m2 to promote maximum health (WHO, 2020). Being overweight and obese is a global health concern; it is very for healthcare workers important (HCWs) to acknowledge the problem, engage in healthy lifestyle activities, and maintain a normal range of BMI as they

are role models for patients and the general population (Kunyahamu et al., 2021). Obesity among healthcare workers (HCWs) is recognized as a critical issue that may affect their health status and work productivity (Kunyahamu et al., 2021). More importantly, nurses constitute the largest group of HCWs and recent reports suggest a rising trend of obesity among professional nurses (Kunyahamu et al., 2021). Nurses are expected to be health educators and promote a healthy lifestyle to increase the quality of life (Adaja et al., 2018). A healthy lifestyle is a set of acts and attitudes people practice to stay healthy and prevent diseases. Body-image perception is one of the determinants in weight management, especially among adolescents. There is

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scientific evidence that an unhealthy body image (BI) is linked to obesity and physical activities (Bucher et al., 2018).

Nursing students play key roles in guiding individuals to practice a healthy lifestyle. Nonetheless, they must integrate their health-promoting behaviors with good body image appearance to maintain a good health status. Health promotion is a process that encourages individuals to control the factors that influence their health by adopting a healthy lifestyle (Gattario et al., 2020). Therefore, it is pertinent to determine the concepts of obesity prevention behavior that are effective in practicing a healthy lifestyle. This study aims to develop an obesity prevention behavior model for nursing students. While numerous studies have emphasized health promotion behavior among nursing students, only a few modeling studies have been conducted to address obesity prevention behavior. Hence, the objectives of this study is to determine the relationship between the perceptions of body image, knowledge of obesity risk, anti-fat attitude, self-efficacy, and healthy lifestyle behavior among nursing students.

Worldwide obesity has risen by nearly triple in the last three decades. Most of the world's population lives in countries where overweight and obesity kills more people than underweight (WHO, 2020). Importantly, obesity is preventable or can be managed for individuals across the lifespan (Barnhart, 2020). Overweight and obesity are defined as abnormal or excessive fat accumulation that may impair health (Nuttall et al., 2015). Body mass index (BMI) is a simple weight index for height index commonly used to classify overweight and obesity in adults. It is defined as a person's weight in kilograms divided by the square of his height in meters (kg/m2). A person is classified as overweight if their BMI is 25 - 29.9, or obese if their BMI is 30 - 39.9, whereas an individual with a BMI of 40 or more is considered severely obese. The increasing prevalence of overweight and obesity represents a global pandemic but remains a preventable nutritional problem worldwide (WHO 2020).

Healthcare workers (HCWs) are responsible for promoting healthy lifestyles to prevent obesity in the community. HCWs were divided into three groups: doctors (house officers, medical officers, specialists), nurses (staff nurses, nurse managers, nurse educators, nurse specialists, nursing students), and other job categories (pharmacists, medical assistants, occupational therapists, physiotherapists, health assistants, medical laboratory technologists, dietitians, and nutritionists). HCWs serve the community's health needs and act as role models for healthy lifestyle behaviors (Nieman, 2023). As a role model for educating patients and the public to prevent obesity, Obesity among HCWs is an important issue as it impacts their morbidity, thereby affecting body image and trust among the public. HCWs are expected to be physically fit to give the public the right image of healthy living and body weight. Unfortunately, various studies have reported a high prevalence of overweight and obesity among HCWs.

Nurses and physicians play an important role in dispensing healthy lifestyle information. Nurses comprise the largest group of HCWs (WHO, 2020), accounting for 50.7% of Malaysian health human resources (Ministry of Health Malaysia, 2016). As the largest occupational group in international healthcare systems, nurses are at the forefront of health promotion to address this health issue, specifically obesity prevention behavior. Nurses and nursing students who are the next generation of health promoters have a significant role in the health promotion of obese and overweight individuals to assist them in achieving healthy lifestyles (Nicola et al., 2020). Today's nursing students are the future workforce, and registered nursing professionals are required to display behaviors that improve and protect their health, enabling them to offer effective health promotion and educate their patients about obesity prevention behavior. This could indicate a need to increase the focus on healthy lifestyle behaviors within the nursing curriculum. Creating a shared educational space that enables nursing students to engage with all perspectives associated with overweight and obesity in a non-judgmental manner, emphasizing the personal, professional, and societal responsibilities of nurses to exhibit healthy lifestyles could be a progressive step towards achieving a healthier nursing workforce and patient population in the future.

Obesity risk knowledge and anti-fat attitude are also vital to prevent obesity among nursing students. Obesity is a disease and can cause various kinds of chronic Hence, prevention degenerative diseases. and management of obesity are key to maintaining health. However, distorted consciousness of body shape due to the favor of thin body shape and the stigma of becoming obese is common among youngsters (Adewole,2021). Nursing science and education is an academic field based on a sensitive understanding of human care and health management. The importance of obesity risk knowledge and developing a positive anti-fat attitude are important for nursing students. This future workforce of nurses needs to be equipped with the ability to understand the emotions of obese patients and overweight people in the community. A good knowledge of obesity risk, a positive attitude towards anti-fat, and a positive body image are

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core components for obesity prevention behavior to regulate situations with human sensitivities to obesity issues. Moreover, nurses are the main core human power in public health and medical places, occupying the biggest portion and having the longest contact with patients.

A healthy lifestyle has been defined as a customary daily activity performed by individuals during their life span. Nurses and student nurses need to engage in healthy lifestyle behavior to ensure they can meet the rising healthcare demand (Gormley et al., 2020). A healthy lifestyle is a behavior that demonstrates responsibility for own health, taking part in physical activity, having adequate nutritional intake, realizing self-actualization, establishing interpersonal relations, and learning how to manage stress. Promoting healthy lifestyle behaviors in nursing students could prevent them from obesity (Deasy et al., 2016). Nurses with positive body image must become role models of healthy lifestyle behaviors to patients and the public (Darch, Baillie, & Gillison, 2017). Understanding patterns of unhealthy behaviors and how they influence the health risks of nursing students would be useful for health promotion interventions. Rather than identifying single risky behaviors, it would be more helpful to intervention efforts to identify patterns of clustered behaviors that characterize subgroups with higher lifestyle risks (Gruszka et al 2022).

2. Method

Study Design

The study employed a cross-sectional design. A crosssectional approach in this study aimed to measure the relationship between the components of the Health Promotion Model and healthy lifestyle behaviour to prevent obesity among nursing students. The components of the Health Promotion Model measured in this study were perceived body image, anti-fat attitude and obesity risk knowledge. These components were measured to determine a relationship between the components of the Health Promotion Model on healthy lifestyle behaviour. In addition, a measurement of the mediator relationship between the existing factors was also carried out.

Population and Sample

"Study population" is defined by Sekaran & Bougie (2016) as an entire group of people and events the researcher decides to investigate. Furthermore, it is defined as a group of people or organizations bearing common characteristics, which may be of interest to the research area in the research question (Creswell, 2014). Generally, in Malaysia, nursing students are trained by Government Colleges or Public universities and by

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Private Nursing Colleges. In this study, the target study population was nursing students from a selected Private Healthcare University in Malaysia, Statistics from student administration documented the total number of nursing students registered for the year 2021 was 1316 nursing students as considered a total number for this study population, hence the sample size determination was 319 to represent the whole population as proposed by Krejci and Morgan (1970).

The sampling method also will help researchers in selecting a representative from the subset of a population. Fundamentally, the stage of selecting a sample from the total population is called sampling. The good practice for the selection of a sample is a random sampling that provides an equal chance for each respondent in the population to be included in the sample thus representative of the population. (Taherdoost, 2016), this study used a simple random sampling method. The random sampling was undertaken by selecting nursing students from every cohort in the selected Healthcare University. In cases where respondents were not available or unwilling to participate, no replacement was made.

Data Collection Technique

Data is the information obtained by a researcher using a research instrument. Data collection through a survey method uses a standardized questionnaire to accumulate data on people 's preferences, opinions, or behaviour systematically to draw inferences about the population (Creswell, 2014). A structured questionnaire was developed to gather feedback from the respondent on their motivating factors for practicing a healthy lifestyle. The data collection process through the survey method was undertaken by distributing the questionnaires to the respondents. This is the most suitable method to accumulate data as the researcher would be able to gather the required information to measure the identified variables (Sekaran and Bougie, 2016). The research population is nursing students in Private healthcare universities. A survey that is confined to a specific area involving many individuals is best undertaken through personally administered questionnaires (Sekaran and Bougie, 2016) A face-to-face technique also provides high opportunities for the respondents to respond to the questionnaires. The researcher explained the study faceto-face with nursing students via Google Meet at the beginning of their online class. There questionnaires distributed via the link through email and WhatsApp groups among nursing students. As expected, many challenges were faced in achieving the required sample size. Only 360 nursing students answered the questionnaire. The answered questionnaires were screened. Ethical guidelines were followed to protect the interest of the respondents by adopting several measures.

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First, the voluntary participation principle was adhered to by asking the lecturer permission to take 15 minutes before the online class began to explain the objective of the study and asking the nursing students to complete the questionnaires voluntarily, whereby the respondents were informed of their right to end their participation at any point in time (Saunders et al. 2009; Sekaran and Bougie, 2016) Second, the anonymity and confidentiality principle was followed which required no personal identification on the questionnaires and the respondents were guaranteed confidentiality whereby all information provided were strictly used for research purposes. Third, a brief introduction about the research, the researchers's status and roles were provided to gain trust and encourage respondents's participation in the survey.

Research Instrument

The questionnaire is a crucial research instrument and core aspect of a quantitative survey research design, and it should be designed following best practices (Radzi. M et al., 2019). Several factors need to be considered when designing and arranging the sections of a questionnaire, which include the research approach, research design, main variables, and sub-variables. In this research, the questionnaire was organized as follows: the first part comprises the respondents' demographic background. The items of the instrument for each construct were adapted with minor modifications to reflect the present research objectives. This study entailed five constructs, namely independent variables such as perceived body image, obesity risk knowledge, anti-fat attitude, selfefficacy as a mediator, and healthy lifestyle behaviour as the dependent variable. Specifically, the questionnaire was designed in five sections. It is the rule of thumb that each variable comprises a few items but not less than three (Hair et al., 2014). Therefore, all variables in the study consisted of a minimum number of items to clarify the notion. Section 1 consists of four demographic variables, including gender, age, race, and body mass index (BMI). Section 2 consists of 10 items that measure perceived body image; Section 3 comprises 10 items that measure obesity risk knowledge. Section 4 consists of 10 items that measure anti-fat attitude, Section 5 comprises 18 items that measure healthy lifestyle behaviour, and the last section 6 comprises 12 items that measure selfefficacy.

Therefore, the questionnaire consisted of a total of 64 items to attain the study objectives. In section one, multiple options were provided for each time and the respondents were asked to provide their answer by selecting an option for each item. Simultaneously, the respondents were asked to convey their opinions through a 5-point Likert scale for the items presented in Sections 2 to 6. The present study contains mainly five variables and consequently, all the variables are measured using the Likert scale. The scales were adapted from existing measurement scales developed by different researchers from various fields. In developing a research instrument, a researcher can develop the instrument, modify an existing instrument or use an intact instrument developed by previous researchers (Creswell, 2014). The researcher has adopted and adapted the instrument for this research. Based on the literature initial questionnaire items were developed. After preparing the questionnaire, the validity by expert content have been done. The Rasch Measurement Model was used to assess the validity and reliability of the pilot study. The data was analyzed using the Winsteps version 3.72.3 software. Data were observed and compared to the acceptable instrument quality criteria and reliability via Cronbach alpha to ensure and test the goodness of the questionnaire and verify its suitability to measure the research variables and reflect any relationships that may exist between them (Sekaran et al., 2009).

Data Analysis

Data analysis in this study used the SEM-PLS technique, with three stages of analysis: 1.) outer model test, in the form of reflective and formative models, to determine the relationship between indicators and latent variables; 2.) inner model test, consisting of Rsquared test (R2), effect size (f2), predictive prevalence (Q2), and Goodness of Fit test. The inner model test aims to determine the relationship between latent variables; and 3.) Hypothesis testing to observe the significance value of the effect of exogenous variables on endogenous variables through the T-statistical value (> 1.96) and pvalue (<0.05). A total of 360 respondents met the criteria for conducting data analysis.

3. Results

The sociodemographic profile of the respondents includes gender, age, ethnicity, and body mass index (BMI) as shown in Table 1.0 Most of the respondents were females (92.5%), of Malay ethnicity (85.3%), and aged 18-21 years old (73.6%). The nursing student's body mass index (BMI) revealed that most respondents were normal (58.0%), 12.9% were overweight, 22.4% were overweight, and 6.6% were obese. The respondents' BMI were classified into five categories; Underweight (BMI were classified into five categories; Underweight (BMI vere classified into five categories; Underweight (BMI setween 18.5 kg/m²), normal body weight (BMI between 18.5 and 24.9 kg/m²), overweight (BMI \geq 30 kg/m²).

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Demographic Variable	Frequency	Percentage
Gender		
Female	322	92.5
Male	26	7.5
Age		
18-21	256	73.6
22- 25	71	20.4
26 and above	21	6.0
Ethnic		
Malay	297	85.3
Chinese	3	.9
Indian	31	8.9
others	17	4.9
BMI		
Obese	23	6.6
Overweight	78	22.4
Normal	202	58.0
Underweight	45	12.9

Table 1.0: Respondents' Demographic Profile (N=348)

Table 2. SEM-PLS Analysis Result

Variable	Cronbach Alpha	Composite Reality	AVE
Perceived Body Image	0.897	0.919	0.654
Obesity Risk Knowledge	0.945	0.956	0.784
Anti-fat Attitude	0.925	0.934	0.639
Self-Efficacy	0.916	0.935	0.705
Healthy Lifestyle Behaviour	0.932	0.944	0.679

Measurement Model

The initial step in PLS-SEM analysis is to assess the measurement model which involves determining the internal consistency reliability, content validity, convergent validity, and discriminant validity of individual items through the administering of the PLS algorithm (Hair et al., 2017). The measurement model is concerned with an estimate of the goodness of measures that describe the relationship between latent constructs and their respective items (Hair et al., 2017).Thus. Assessing the model's reliability and validity is very important to evaluate the model's goodness in the measurement model. The measurement model for this study was evaluated by Cronbach's alpha and composite reliability (CR) to investigate internal consistency, and through average variance extracted (AVE) to examine

convergent validity. All the result showed in table 2 indicates that a level above 0.8 indicating that the construct had a high level of internal consistency the composite reliability (CR) coefficient value ranges shows between 0.919 to 0.956 which is higher than the value of the minimum level of 0.7, which indicates high levels of internal consistency reliability (Hair et al. 2017). Thus, the results indicate that the items used to represent the constructs have acceptable internal consistency reliability. The measurement model's convergent validity is assessed by examining its average variance extracted (AVE) value. Convergent validity is adequate when constructs have an average variance extracted (AVE) value of at least 0.5 or more. In this measurement model assessment, Table 2 above depicts the score for AVE score across five latent constructs

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namely Anti-fat Attitude, Perceived Body Image, Obesity Risk Knowledge, Self-efficacy, and healthy lifestyle. Every latent construct has exceeded the minimum threshold proposed value, which is 0.50 (Hair et. al 2017). Specifically, the AVE values of Anti-fat Attitude (0.639) and Perceived Body Image (0.654). Obesity Risk Knowledge (0.784), Self-efficacy (0.705) Healthy Lifestyle (0.679) all are above the minimum level of 0.5, thus the measure of five reflective constructs has high levels of convergent validity.

Structural Model Assessment

The first step in the evaluation of the structural model is the assessment of the collinearity issue, while the second step is the assessment of the significance and relevance of the structural model relationships. The third step in structural model assessment is through statistical analysis to obtain the level of coefficient of determination, which is the R² value. The fourth step is the assessment of the effect size to R², which is the value of f². The fifth step is the assessment in analysing the predictive relevance of the Q² value. The last step is to analyse the effect of the size of the q² value. However, this step is optional in evaluating the structural model. The PLS-SEM (Smart PLS) does not have the function for obtaining the q2 value. Therefore, further analysis is performed manually to determine the q2 value. The next subsection entails the first step of assessment in the structural model, which is the collinearity issue.

Structural Model Evaluation on significance and relevance of the structural Model relationship

Note: ***Significant at 0.01 (1-tailed), **significant at 0.05 (1-tailed), *significant at 0.1 (1-tailed)

In this statistical analysis, (Ramayah et al, 2018) recommend a bootstrapping technique procedure. There is a need for the researcher to observe the path coefficients as it represents the significance of the hypothesis's relationship tested within the link of constructs (Ramayah et al, 2018). The significant relationship of the structural model is assessed by interpreting the path coefficient, which is within the range of -1 to +1. It is considered a strong positive relationship when approaching 1 or a strongly negative relationship started with an investigation of the direct relationship in the study.

НО	Direct Path	Beta Value (Beta β)	T- statistic value	P value	Remarks
H1	Perceived Body Image -> Healthy Lifestyle	0.002	0.084	0.933	Rejected.
H2	Perceived Body Image -> Self-Efficacy	- 0.168	3.837	0	Supported
H3	Obesity Risk Knowledge -> Healthy Lifestyle	- 0.009	0.276	0.783	Rejected
H4	Obesity Risk Knowledge -> Self-Efficacy	- 0.117	2.117	0.034	Supported
H5	Anti-fat Attitude->Healthy Lifestyle	0.055	1.098	0.272	Rejected
H6	Anti-fat Attitude -> Self-Efficacy	0.054	0.618	0.537	Rejected
H7	Self-Efficacy -> Healthy Lifestyle	0.825	37.805	0	Supported

Table 3.0 the direct relationship between the variables.

Table 3.0 above stated all the p-values were used to determine the hypothesised for direct relationships. Hypothesis 1 (H1) predicts that Perceived Body Image is related to healthy lifestyle behaviours, but no significant relationship was discovered between the two variables (Beta β =0.002, t=0.084, p<0.933). Hence hypothesis 1 (H1) is rejected.

Hypothesis 2 (H2) predicts that a positive relationship exists between Perceived Body Image and Self-Efficacy (Beta β = -0.168, t=3.837, p<0.000). Hence hypothesis 2 (H2) is supported.

Hypothesis 3 (H3) predicts that Obesity Risk Knowledge is related to a Healthy Lifestyle but the result was not significant (Beta β = -0.009, t=0.276, p<0.783). Hence hypothesis 3 (H3) is rejected.

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Hypothesis 4 (H4) predicts that Obesity Risk Knowledge is related to Self-efficacy. Specifically, the result indicates that Obesity Risk Knowledge has a significant positive relationship with self-efficacy (Beta β =-0.117, t=2.117, p<0.034). Hence hypothesis 4 (H4) is accepted.

Hypothesis 5 (H5) predicts that Anti-fat Attitude has a significant relationship with Healthy Lifestyle, however, the result was not significant (Beta β =0.055, t=1.098, p<0.272). Hence, the hypothesis 5 (H5) is rejected.

Hypothesis 6 (H6) predicts that Anti-fat Attitude has a significant relationship with Self-efficacy. Specifically, the result indicates that Anti-fat Attitude has no significant relationship with Self-efficacy (Beta β =-0.054, t= 0.618, p<0.537). Hence hypothesis 6 (H6) is rejected.

Hypothesis 7 (H7) predicts a significant relationship between self-efficacy and Healthy Lifestyle, and the hypothesised relationship was positive and significant (Beta β =0.285, t=37.805, p<0.000). Therefore, the hypothesis 7 (H7) is accepted.

In summary, the structural model assessment of the relevance relationship shows that there is no direct relationship between perceived Body Image and a healthy lifestyle, Anti-fat Attitude and a healthy lifestyle, and the relationship between Obesity Risk Knowledge and a healthy lifestyle. This study aims to examine the factors of perceived Body Image, anti- fat Anti-fat Attitude and Obesity Risk Knowledge to predict nursing students' desire to practice healthy lifestyles but the result shows that there are no statistically significant correlations were found, between these three factors towards a healthy lifestyle, thus there is a significant relationship between Perceived Body Image and self-

efficacy, Obesity Risk Knowledge with self-efficacy as well as significant relationship between self-efficacy and Healthy lifestyle. The result shows there are intermediary factors of self-efficacy as a mediator that contribute to healthy lifestyle behaviour among nursing students.

Structural Model Evaluation of the Level of $\mathbb{R}^{2,}$ coefficient

The coefficient of determination, in statistics, R^2 (or r2), is a measurement that assesses the ability of a model to predict or explain an outcome in the linear regression setting (Ramayah et al, 2018). The effect range describes the level of predictive accuracy from values ranging between 0 and 1. A higher value of the coefficient of determination (R²⁾ indicates a higher level of predictive accuracy (Ramayah et al, 2018). The level of acceptance to describe the values of the coefficient of determination should be based on the rule of thumb. The results are presented in Table 4.0, indicating the coefficient of determination, the exogenous variables (Perceived Body Image, Obesity Risk Knowledge, and Anti-fat Attitude) explained the endogenous variable (Healthy Lifestyle = 0.688). Specifically, the predictors of Perceived Body Image, Obesity Risk Knowledge and Anti-fat explain 68.8% of the variance in Healthy Lifestyle. In summary, Table 4.0 presents the R² value of 0.688 showing that all the exogenous latent constructs such as Perceived Body Image, anti-fat Attitude and Obesity Risk Knowledge predict 68.8% of the variance of healthy lifestyle behaviour. The analysis of the model shows that Perceived Body Image, anti-fat-anti-fat Attitude and Obesity Risk Knowledge can only explain 68.8% of the variance in Healthy lifestyle behaviour. This suggests that other factors explain the variance.

Exogenous Latent Variable	f^2	q^2	R ²	Q^2
Perceived Body Image	0.000	0.02		0.462
Anti-fat Attitude	0.009	0.000		0.000
Obesity Risk Knowledge	0.000	0.02		0.462
Endogenous Latent Variable				
Healthy Lifestyle			0.688	

Table 4.0 Summary coefficient of determination, R²

Development of Final Model

Upon completing the research model analysis through the PLS-SEM technique, the developed proposed path model was evaluated by following these two steps process, Evaluation of the measurement model and Evaluation of the structural model. The summary of the evaluation structural model result is presented in Table 5.0

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Coefficient	β	р	t	remarks	R2	f2	Q2	q2
Perceived Body Image -> Healthy Lifestyle	0.002	0.084	0.933	Rejected.	0.688	0.000	0.462	0.02
Perceived Body Image -> Self- Efficacy	-0.168	3.837	0.000	supported	0.044	0.030	0.029	0.02
Obesity Risk Knowledge -> Healthy Lifestyle	-0.009	0.276	0.783	Rejected	0.688	0.000	0.462	0.009
Obesity Risk Knowledge -> Self-Efficacy	-0.117	2.117	0.034	Supported	0.044	0.014	0.029	0.009
Anti-fat Attitude-> Healthy Lifestyle	0.055	1.098	0.272	Rejected		0.009		
Anti-fat Attitude -> Self-Efficacy	0.054	0.618	0.537	rejected		0.003		
Self-Efficacy -> Healthy Lifestyle	0.825	37.805	0.000	Supported		2.088	0.462	

Table 6.0, below indicate the Anti-fat Attitude construct path coefficient was not significant, and the hypotheses were rejected. Figure 1.0 shows the proposed model of Obesity prevention with three exogenous constructs (Perceived body image, obesity risk knowledge and antifat attitude) mediated by self-efficacy and a relationship with endogenous construct (Healthy lifestyle). Therefore, for the final Model, (Figure 2) the Anti-fat Attitude construct was removed from the path model. The new model was developed as an Obesity Prevention Model for nursing students that has been validated and fulfilled all the assessment methods.

Perceived body image, obesity risk knowledge and selfefficacy has significant impact towards desire to practice a healthy lifestyle. This result shows the proposed Research model with Perceived body image, Obesity risk knowledge, and Anti-fat attitude as independent variable. Self-efficacy as mediator and healthy lifestyle as dependent variable. The new model suggests that were only three significant variables, and Self-efficacy has the strongest effect on the desire to practice a healthy lifestyle, followed by Perceived body image and obesity risk knowledge. The finding strongly determine that nursing students need the motivation of self-efficacy as the mediator to enhance the desire to practice a healthy lifestyle as the result showed self-efficacy as full mediation VAF value > 80% and was found to be the strongest indicator of effect size f2 (2.088) that affects the healthy lifestyle behaviour among nursing students.

Hypothesis	Path Direction	β	t- value	P value	Remarks
H1	Perceived Body Image -> Healthy Lifestyle	0.002	0.084	0.933	Rejected.
H2	Perceived Body Image -> Self-Efficacy	- 0.168	3.837	0	supported
Н3	Obesity Risk Knowledge -> Healthy Lifestyle	- 0.009	0.276	0.783	Rejected
H4	Obesity Risk Knowledge -> Self-Efficacy	- 0.117	2.117	0.034	Supported
Н5	Anti-fat Attitude->Healthy Lifestyle	0.055	1.098	0.272	Rejected

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H6	Anti-fat Attitude -> Self-Efficacy	0.054	0.618	0.537	Rejected
H7	Self-Efficacy -> Healthy Lifestyle	0.825	37.805	0	Supported
H8	Anti-fat Attitude-> Self-Efficacy -> Healthy Lifestyle	0.087	0.618	0.537	Rejected
Н9	Perceived Body Image -> Self-Efficacy -> Healthy Lifestyle	0.044	3.837	0	Accepted
H10	Obesity Risk Knowledge -> Self-Efficacy -> Healthy Lifestyle	0.055	2.117	0.04	Accepted

Table 6.0 Summary of Structural Model Assessment Direct Effect and with Mediator (Indirect Effects) Finally from the finding of this study shows the new model of obesity prevention for nursing students has been developed (Figure 2.0), the path model showed



Figure 1.0 Proposed Obesity Prevention Model

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Figure 2.0: Final validated model development as Obesity Prevention Model for nursing Students with Algorithm result. **4. Discussion** risk might arise from the lack of emphasis on the subject

Perceived Body image is one's perception of personal physical appearance, leading to body image satisfaction or body image dissatisfaction. A positive body image is being happy in our own body, being comfortable most of the time with our physical appearance, and feeling good about ourselves. (Darch et al. 2017). Nursing students' perception of body image may be influenced by their socio-demographic characteristics such as gender, body weight, BMI, knowledge of obesity and physical or mental health status (Gruszka et al., 2022). In this study, these potential associations were not assessed but they may contribute to the diverse perception of body image relayed by the nursing students. Gruszka et al. (2022) found that the frequency of body size and weight underestimation was significantly higher among men compared to women. Being overweight and obese is a major health challenge worldwide therefore, Obesity risk knowledge is an important factor in the management of obesity prevention (Thaher et al. 2018). Nurses play a vital role in the prevention of obesity by educating patients and the public about nutrition, physical activity, and other weight-related issues. Findings from the present study revealed that 34.2% of the nursing students had poor knowledge of obesity risk compared to 40.8% that exhibited good knowledge of obesity risk. Meanwhile, similar proportions displayed low, moderate and high anti-fat attitude scores at 28.4%, 39.4%, and 32.2%, respectively. In terms of lifestyle behaviour, a higher proportion (46.3%) recorded good and healthy lifestyle behaviour relative to those with poor to moderate healthy lifestyle behaviours (each at 27.0%). Nursing students' knowledge deficit regarding obesity

risk might arise from the lack of emphasis on the subject in current nursing curricula, lack of training on obesity and poor attitudes toward developing and updating their knowledge on obesity. Thus, it was not surprising as nursing students in the present study also demonstrated an unacceptable prevalence of low anti-fat attitude at 28.0%. Poor knowledge of obesity has been found to correlate with poor attitude towards obesity among different categories of students, including nursing students (Gormley and Melby, 2020). Poor lifestyle behaviours mainly encompass poor eating behaviours and inadequate physical activities, which are among the most significant public health issues facing adolescents and youths, including nursing students (Roy et al., 2021). Eating behaviours and physical activities were considered in the present study when probing nursing students on their lifestyle behaviours. As observed in our study, a high prevalence of poor lifestyle behaviour in a given population indicates high risk of disordered eating behaviours, high BMI, and sedentary lifestyle (Roy et al., 2021; Ohara et al., 2019; Mohamed Radzi et al., 2019). These events are strongly associated with a higher risk of morbidity and mortality in adulthood (Ohara et al., 2019). Likewise, in nursing students are faced with sedentary life style and low participation in physical activities, as well as home environment that may discourage a healthy lifestyle. These findings contribute to evidence-based practice of the critical plan to enhance the nursing curriculum for nursing students to maintain ideal body weight, increase their satisfaction, and perceive positive body image as a good appearance in front of their patients and the public. Satisfaction and positive perceived body image among nursing students will increase their confidence level to become role

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models of healthy lifestyle behaviour among patients and the public. Therefore, new model development of Obesity Prevention model for nursing students can give new contribution as evidence base to prevent obesity among future nurses. This evidence also given the significance of self-efficacy in the present study, more effective intervention and policy recommendations may target this factor in the nursing context to develop preventive measures during the early stage of their nursing training as students. Notably, being an obese nurse carries a significant risk for non-communicable diseases and will ultimately affect healthcare services (Kunyahamu et al 2021).

5. Conclusion

The model measurement assessment is used to evaluate the predictive accuracy of the path model in other words the model's accuracy can be evaluated using predictive validity (Q^2) . The Q^2 criteria recommend that the conceptual model must be able to predict the dependent variable. Table 5.0 depicts the summary of predictive relevance, which is represented by the Q squared (Q^2) value. The Q squared (Q²⁾ value of the healthy lifestyle construct (endogenous construct) was 0.426 while selfefficacy has a value of 0.029. The level of acceptance in interpreting the Q² Predictive relevance value should be larger than 0 (Hair et al, 2017). Based on the result obtained, the proposed model has sufficient predictive relevance as the Q² is larger than 0. The results indicate that perceived Body Image Obesity Risk Knowledge and self-efficacy have small predictive relevance on healthy lifestyle behaviour. This is above the threshold and confirms that the predictive relevance of the path model of the endogenous construct is valid. Among the investigated variables, self-efficacy depicted a direct significant association with perceived body image, as well as influencing nursing students' knowledge of obesity risk and healthy lifestyle. Self-efficacy also mediated the relationships between the latter variables. Thus, nursing students' self-efficacy is a strong predictor of body image perception and should be considered a key variable in developing obesity prevention interventions among nursing students. These findings have important implications for policymakers and relevant bodies in Malaysia's educational and health sector towards developing effective strategies to improve perceived body image, understanding of obesity risk, and producing nurses that will become role models for these important health issues at community and national levels.

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Ethical Considerations

This study was conducted in accordance with research ethical standards and all research protocols have received ethical approval from the research ethics committee of the Research Management Centre of KPJ Healthcare University with number KPJUC/RMC/SON/EC/2021/318

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