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Structural Equation Modeling of Health Literacy, Self-Efficacy, Physical Activity, Dietary Pattern and Body Image in Obese Young Adults in Tomohon City

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Abstract

The prevalence of obesity is at a dangerous level. This situation is influenced by the extreme value of Tomohon city. This study aims to create Structural Equation Modeling of health literacy, self-efficacy, physical activity, dietary pattern and body image in obese young adults in Tomohon City and to analyze the influence between health literacy, self-efficacy, dietary pattern, physical activity and body image in obese young adults in Tomohon City. This research is a non-experimental research with a quantitative approach. Sample were 161 adults, aged 20-30 years, and had a total BMI ≥25. Data analysis was carried out by testing the structural equation modeling using Smart PLS. The results showed that structural equation modally of health literacy, self-efficacy, physical activity, dietary pattern and body image in this research can be used to show how strong the effect or influence of one variable was on another variable. Based on the equation modeling, several variables have a weak and strong influence so that the effect between variables also has different percentages.

Keywords: *structural equation modeling, obese, health literacy, self-efficacy, physical activity, dietary pattern, body image*

Background

In Indonesia, the prevalence of obesity is at a dangerous level. There was a two-fold increase from 10.5% in 2007 to 21.8% in 2018. This situation is influenced by the extreme value of Tomohon city; 33% in 2013 and around 40% in 2018. Campaigns to reduce the prevalence of obesity, such as Clean and Healthy Living Behavior (*Perilaku Hidup Bersih dan Sehat*) and Healthy Lifestyle Movement (*Gerakan Masyarakat Hidup Sehat*) carried out during the last decade have proven unable to prevent its increase[1,2]

If the aforementioned situation is not treated promptly, the number of sufferers of endocrine system disorders is likely to continue to rise to 77%, followed by an increase in the number of people with cardiovascular, gastrointestinal diseases, liver and kidney disorders as well as various types of cancer to mental problems. The combination of those issues will dominate global health financing and burden the state budget and spending by up to 20% annually (over US $ 2 trillion). It lowers the productivity of the population by up to $ 2000 US/capita, reduces life expectancy by 10 years, and increases the mortality ratio by 7.7%[3-6]

Furthermore, young adults are an important transition period in shaping long-term health behavior patterns that can affect a person's health status in the future. Failure to establish a healthy lifestyle that has become a habit during this period can lead to serious chronic health problems. Young adults who have hypertension and early T2DM are more likely to have long-term risks for poor blood pressure and glycemic control. They are also at greater risk for developing diabetes complications[7]

An initial step of public health efforts in controlling obesity in this age range is to carry out Structural

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Equation Modeling (SEM) to identify pathways of risk factors for the incidence of obesity in young adults such as individual characteristics including demographic and socioeconomic status in a region, dietary pattern, physical activity, self-efficacy. and body image. This study aims to create Structural Equation Modeling of health literacy, self-efficacy, physical activity, dietary pattern and body image in obese young adults in Tomohon City and to analyze the influence between those variables in obese young adults in Tomohon City.

Methods

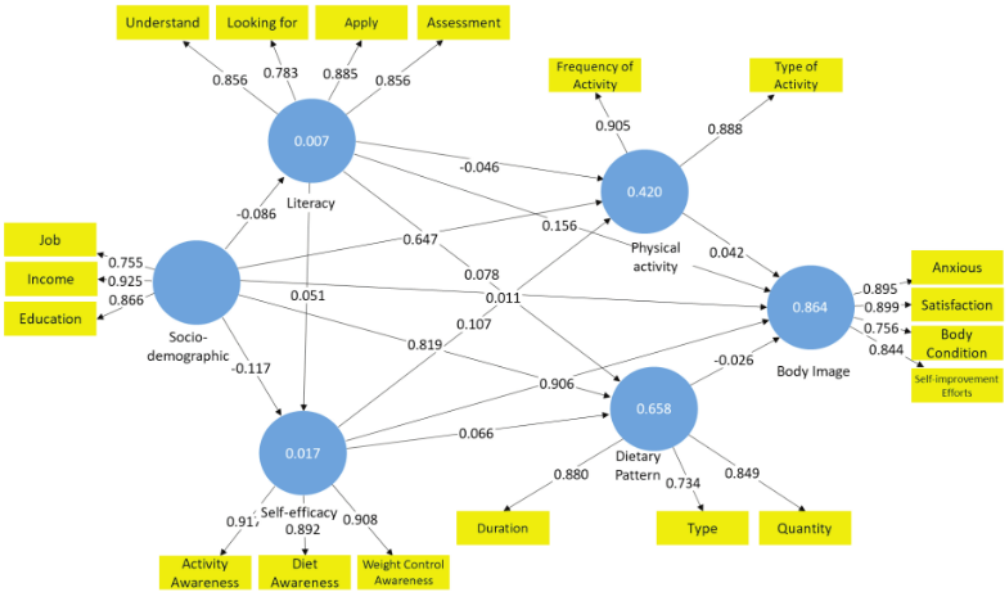
This research is a non-experimental research with a quantitative approach. The research design used was descriptive correlational analytic with cross-sectional approach. It was conducted in Tomohon City, North Sulawesi Province. Sample were 161 adults aged 20-30 years and had a total BMI ≥25.

Variables in this study were obtained by:

1. Health literacy utilized food labels assessed by the Newest Vital Sign (NVS)
2. Self-efficacy was measured by the Weight Efficacy Lifestyle Questionnaire (WEL)
3. Body Image was measured by evaluating an individual's assessment of their appearance
4. Physical activity measured included intensity, frequency, amount of physical activity performed in 1 week and its duration.
5. Measured dietary pattern measured by Food Frequency Questionnaire (FFQ)

Data analysis was carried out by testing the structural equation modeling using Smart PLS. More importantly, Path Coefficient test was used to see the strength of the influence of each variable. Since this study utilized the Concurrent Transformative Strategy combination approach, data merging could be done by combining with the same weight (merging), connecting or mixing with unequal weights (embedding).

Results



Based on the PLS Algorithm, here is a model to be used in this research:

Figure 1 Structural Equation Model

After obtaining a fit model, the next step was to evaluate the inner model through the path coefficients test. It was used to show how strong the effect or influence of one variable was on another variable. Based on the test, variable with the greatest effect was socio-demographic on dietary pattern (0.819 or 81.9%).

Table 1 The Indirect Influence Between Variables

	Sample (O)	P-values
Physical activity à Body image	0.042	0.300
Self-efficacy à Physical activity	0.107	0.060
Self-efficacy à Body image	0.906	0.000
Self-efficacy à Dietary pattern	0.066	0.187
Literacy à Physical activity	-0.046	0.513
Literacy à Body image	0.156	0.000
Literacy à Self-efficacy	0.051	0.535
Literacy à Dietary pattern	0.078	0.124
Dietary pattern à Body image	-0.026	0.646
Socio-demographic à Physical activity	0.647	0.000
Socio-demographic à Body image	0.011	0.844
Socio-demographic à Self-efficacy	-0.117	0.142
Socio-demographic à Literacy	-0.086	0.291
Socio-demographic à Dietary pattern	0.819	0.000

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Based on Table 1, it can be seen that:

1. Physical activity does not have significant relationship with body image (p = 0.300), while the effect of physical activity on body image is 4.2%.
2. Self-efficacy does not have significant relationship with physical activity (p = 0.060), while the effect of self-efficacy on physical activity is 10.7%.
3. Self-efficacy has significant relationship with body image (p = 0.000), while the effect of self-efficacy on body image is 90.6%.
4. Self-efficacy does not have significant relationship with dietary pattern (p = 0.187), while the effect of self-efficacy on dietary pattern is 6.6%.
5. Literacy does not have significant relationship with physical activity (p = 0.513), while the effect of literacy on physical activity is 4.6% with a negative direction.
6. Literacy has significant relationship with body image (p = 0.000), while the effect of literacy on

body image is 15.6%.

7. Literacy does not have a significant relationship with self-efficacy (p = 0.535), while the effect of literacy on self-efficacy is 5.1%.
8. Literacy does not have significant relationship with dietary pattern (p = 0.124), while the effect of literacy on dietary pattern is 7.8%.
9. Dietary pattern does not have significant relationship with body image (p = 0.646), while the effect of dietary pattern on body image is 2.6% with a negative direction.
10. Socio-demographic has significant relationship with physical activity (p = 0.000), while the effect of socio-demographic on physical activity is 64.7%.
11. Socio-demographic does not have a significant relationship with body image (p = 0.844), while the effect of socio-demographic on body image is 1.1%.
12. Socio-demographic does not have a significant relationship with self-efficacy (p = 0.142), while the effect of socio-demographic on self-efficacy is 11.7% with negative direction.
13. Socio-demographic does not have a significant relationship with literacy (p = 0.291), while the effect of socio-demographic on literacy is 8.6% with negative direction.
14. Socio-demographic has a significant relationship with dietary pattern (p = 0.000), while the effect of socio-demographic on diet is 81.9%.

Discussion

Physical activity does not have significant relationship with body image, while the effect of physical activity on body image is 4.2%. It is in line with a research conducted by Ferrari et al. on university students in Brazil and Rech et al. on students in Parana, Portugal[8,9]. Moreover, nutritional status is influenced by eating behavior, while eating behavior is influenced by opinions about the importance of health[10].

Self-efficacy does not have significant relationship with physical activity, while the effect of self-efficacy on physical activity is 10.7%. The impact of self-efficacy on a person's cognitive processes differs from one another. Most of behaviors change according to thinking to achieve goals. The higher a person sets goals or challenges, the more confident he/she will keep his/her commitments[11]. It is supported by a research by Anggraeni which found that self-efficacy has a significant relationship with physical activity[12].

Additionally, self-efficacy has significant relationship with body image, while the effect of self-efficacy on body image is 90.6%. Self-efficacy basically can determine how people feel, think, motivate themselves and behave, solve problems, or in the process of adjusting to stress. A person requires confidence in his/her own abilities since it will determine the action taken and the final result[13,14].

Self-efficacy does not have significant relationship with dietary pattern, while the effect of self-efficacy on dietary pattern is 6.6%. Strong belief in the ability to perform particular behavior increases the possibility that the behavior can be achieved[15]. This is related to the motivation to realize what is believed. The most important thing an individual must have in order to carry out healthy behavior is self-efficacy[16]. In contrast to the results of this study, self-efficacy does not have a significant effect on dietary pattern. Factors that generally influence the formation of dietary pattern include economic, socio-cultural, religious, educational and environmental factors[17]

Literacy does not have significant relationship with physical activity, while the effect of literacy on physical activity is 4.6% with a negative direction. The results of this study are in line with a research conducted by Rohmah et al. that also found that there is no significant relationship between literacy and physical activity[18]

Literacy has a significant relationship with body image, while the effect of literacy on body image is 15.6%. Literacy is related to what someone sees and hears, so that it can create perceptions about the subject of the information he/she sees. One of types of literacy sources that is also popular among women is mass media. Mass media and pictures in fashion magazines have an important effect on both teenage girls and adult women in perceiving their weight and body shape by making their own ideal beauty criteria[19,20]

Literacy does not have significant relationship with self-efficacy, while the effect of literacy on self-efficacy is 5.1%. Health literacy is important for every individual since it relates to the ability to obtain health information as an attempt to improve and maintain their

health. In general, health literacy is said to increase health knowledge and assist individuals/communities in making informed decisions about their health[21]. High level of health literacy skills enable a person to act independently in overcoming personal, structural, social and economic barriers[22-24]. Thus, people's skills in acquiring and applying health-related knowledge can have a significant effect on individual well-being[25].

Literacy does not have significant relationship with dietary pattern, while the effect of literacy on dietary pattern is 7.8%. Many factors can affect dietary pattern, such as economic, socio-cultural, religious, educational and environmental factors[17] . Thus, someone with a low level of literacy does not always indicate that he/she has a bad diet, and vice versa.

Dietary pattern does not have a significant relationship with body image, while the effect of dietary pattern on body image is 2.6% with a negative direction. Dietary pattern is a description of information about the consumption of various amounts of ingredients and types of food in every day and is a characteristic of certain groups of people[26]. Body image can be influenced by dietary pattern, but the results of this study indicate the opposite, which explains that there is no significant relationship between dietary pattern and body image.

Socio-demographic has a significant relationship with physical activity, while its effect on physical activity is 64.7%. Socio-demographic is needed since people and the environment interact with each other in which humans can act as subjects and objects. In this case, the number of humans will increase and environmental conditions tend to decrease[18]. In this case, socio-demographic factors play a role in the implementation of a person's physical activity pattern considering that it is attached to each individual and is carried on in daily activities.

Socio-demographic does not have a significant relationship with body image, while its effect on body image is 1.1%. Body image is the result of a reciprocal relationship between events in environment, cognitive, affective, physical processes, and individual behavior[27].

Socio-demographic does not have a significant relationship with self-efficacy, while its effect on self-efficacy is 11.7% with negative direction. The formation of perceptions in a person occurs along with the processes experienced during life, while undergoing certain experiences, seeing, hearing and feeling something. When someone has gone through these experiences, there is a tendency to form a perception that is believed, both towards that object and towards oneself.

Socio-demographic does not have a significant relationship with literacy, while its effect on literacy is 8.6% with a negative direction. Health information can be obtained from anywhere since literacy sources come in various forms, such as printed media, electronic media, and even direct delivery, so that access to health information is not only limited in terms of employment and economic factors.

Socio-demography has a significant relationship with dietary pattern, while its effect on dietary pattern is 81.9%. Many socio-demographic indicators can influence dietary pattern. Economic variable determines food purchasing power, therefore, the less income, the lower the quality and quantity of food consumed by the community. The abstinence from consuming types of food can be influenced by social cultural factors in local customs beliefs which become habits.

Conclusion

Based on the equation modeling, several variables have a weak and strong relationship so that the effect between variables also has different percentages. Thus, it can be concluded that efforts to reduce obesity in Tomohon City can be done by prioritizing variables with greater percentage of effect, including socio-demographic on dietary pattern.

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Ethical Clearance: Health Research Ethics Committee, Faculty of Public Health, Universitas Hasanuddin

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