

Relationship between Self-efficacy and Outcome Expectation on Body Mass Index in the Elderly Population

Cerika Rismayanthi^{1,*}, Abdul Alim², Krisnanda Dwi Apriyanto¹, Rizki Mulyawan¹,
Yulvia Miftachurochmah²

¹Department of Sport Science, Faculty of Sport Science, Yogyakarta State University, Indonesia

²Department of Sports Coaching Education, Faculty of Sport Science, Yogyakarta State University, Indonesia

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Abstract Objective: This study aims to determine the relationship between self-efficacy and outcome expectation of the Body Mass Index in the elderly population. **Methods:** This research is an analytical observational study conducted with a cross-sectional approach. Sampling was done by consecutive sampling technique with a total of 118 samples (61.7 ± 8.3 years; 153.7 ± 8.3 cm; 60.5 ± 12.7 kg; $BMI = 25.5 \pm 4.6$ kg/m²). Data analysis in this study uses the Pearson product-moment correlation technique. **Results:** The results of this study show a significant negative relationship between self-efficacy dimension 1 and BMI because of the value of sig. < 0.05 , r count is negative and r count $< r$ table -0.1809 . There is a significant negative relationship between self-efficacy dimension 2 and BMI because of sig value. < 0.05 , r count is negative and r count $< r$ table $(-0.203 < 0.1809)$. There is a significant negative relationship between 3rd dimension self-efficacy and BMI because of the value of sig. < 0.05 , r count is negative and r count $< r$ table $-0.278 < -0.1809$. There is a significant negative relationship between the outcome expectation (positive) and BMI because of the sig. < 0.05 , r count is negative and r count $< r$ table $-0.205 < 0.1809$. There is a significant positive relationship between the outcome expectation (negative) and BMI because of the sig. < 0.05 , r count is positive and r count $> r$ table $(0.523 > 0.1809)$.

Conclusion: It can be concluded that self-efficacy in doing physical activity and understanding the benefits obtained after doing sports has a significant relationship with BMI values in the elderly.

Keywords Self-efficacy, Outcome Expectation, BMI, Elderly, Physical Activity

1. Introduction

Aging is a process that will be experienced in a person's life. With increasing age, changes in various body systems [1]. According to WHO, there are 4 qualifications for the elderly, namely middle age aged 45-59 years, elderly aged 60-74 years, elderly aged 75-90 years, and ancient age exceeding 90 years. Increasing age will make you more vulnerable to various physical complaints.

The elderly phase can be recognized by the decline in body functions, including a decrease in physical fitness, which includes a decrease in cardiovascular endurance, strength, balance, and body flexibility, resulting in reduced independence in daily life [2]. A decrease in physical fitness and psychological aspects also experience changes such as having feelings of inadequacy, feeling useless,

depression, schizophrenia (including psychopathology), withdrawal from social life, eccentric behavior, and illogical thinking. Delusions and hallucinations rarely appear, loss of connection with friends and family. This is due to the limited space for movement or because many of his friends and family have died. Changes that occur in each individual will impact changes in mood, attitudes towards the environment, social activities, and social life.

The increase in psychological problems will increase with age. This statement is also in line with research conducted [3], which states that psychological problems such as depression, when compared to adolescents, older adults, or often called the elderly, will be more often affected by depression.

Thus, the elderly are essential research objects to be studied more deeply.

In addition to physical and psychological barriers, they also often experience a decline in social cognitive function, which prevents them from increasing their physical activity [4]. In the context of physical activity, social cognitive theory operates on three basic assumptions:

- a) There is an interaction between a person's personal or cognitive factors, physical activity behavior, and environment.
- b) An individual can adjust their physical activity behavior through a process of anticipation, self-reflection, and self-regulation.
- c) The learning process can occur without immediate changes in physical activity behavior.
- d) To explain the determination of someone's behavior, there are two primary constructs of this theory, namely self-efficacy and outcome expectation, which refer to older adults' beliefs about the likelihood and value of the consequences of participating in physical activity.

Along with other social cognitive theory constructs, including collective efficacy, observational learning, social support, and self-regulation, it can serve as a framework for explaining and promoting physical activity.

Several interventions utilizing constructs from the social cognitive theory have been used in several studies to promote and increase engagement in physical activity [5]. Compared with other behavioral change theory-based interventions, some of these interventions have resulted in long-term (>6 months) behavior change [6,7]. In addition, outcome expectations also play an essential role in changing physical activity behavior [8] in the adult population and the elderly [4,9,10]. Other forms of social cognitive theory, such as collective efficacy and observational learning, are rarely used to promote physical activity in adults or the elderly population.

Self-efficacy in the context of physical activity behavior is defined as people's beliefs about their ability to be physically active or exercise. The level of self-efficacy determines how people feel, think, motivate themselves, and behave. Self-efficacy is influenced by cognitive,

motivational, affective, and selection processes.

High self-efficacy increases a person's achievement, in this case, related to physical activity or sports. People with high self-efficacy can remain physically active or exercise despite obstacles and difficulties. These obstacles and difficulties are seen as challenges to be faced rather than as threats to be avoided. Someone with high self-efficacy will still maintain their efforts even though they experience difficulties and failures. They seek to improve their knowledge and skills to cope with failure. People with high self-efficacy can reduce stress and are not prone to depression and vice versa. People with low self-efficacy tend to avoid obstacles and difficulties, as Chang [11] said that someone with higher self-efficacy tends to have less depression.

Outcome expectation, in this case, is a person's perception of the extent to which exercise is beneficial to him. Outcome expectations in sports physical activity behavior are a person's perception of how vital, and likely the person is to get the benefits or consequences of the physical activity carried out. Someone who has a high outcome expectation in sports behavior will be more motivated to exercise to get the desired benefits.

Social cognitive constructs such as self-efficacy and outcome expectations are significant correlates of physical activity behavior and thus can be used as a framework in the development of physical activity intervention strategies in the elderly population [10,12], thus issues related to self-efficacy. It is crucial to examine efficacy and outcome expectations again, whether it is true that self-efficacy and outcome expectations are correlated in the elderly population, especially the elderly population in Indonesia. These two constructs are the two main predictors of physical activity behavior, while other constructs such as self-regulation and social support are supporting constructs [13–15].

One way to measure the ideal state of the human body is to use the Body Mass Index (BMI). According to Fryar [16], "Body Mass Index is defined as body weight divided by height." BMI reflects the amount of body fat more than muscle and bone and is used to measure body fatness in the elderly. Body Mass Index is useful for measuring weight and height, which are usually influenced by a person's body state.

The purpose of this study was to determine the relationship between self-efficacy and expectations of the benefits of exercise (Outcome Expectation) on Body Mass Index in the elderly population, especially those in Indonesia. Another goal in this study is that the results that will be found can have implications for the elderly, both the elderly in Indonesia and all over the world.

2. Materials and Methods

This research is an analytical observational study conducted with a cross-sectional approach. Namely, the

type of research that emphasizes the measurement time or data observation once at a time is carried out on the dependent and independent variables, with all subjects who come at that time participating in data collection or measurement [17].

Research Populations and Sample

Sampling was done by consecutive sampling technique. Samples were taken from all subjects who came and met the selection criteria until the number of subjects was met. The sample in this study was the elderly population in several elderly communities in Yogyakarta, Indonesia. The research sample was 118 (61.7 ± 8.3 years; 153.7 ± 8.3 cm; 60.5 ± 12.7kg; BMI = 25.5 ± 4.6 kg/m²) elderly women and men who participated in this study (Table 1).

Research Instruments

Self-efficacy Instrument

For the self-efficacy variable, adapt the instrument compiled by [18–23], adapted to the language and characteristics of the elderly in Indonesia. This instrument was adapted using a cross-cultural technique covering two processes, namely (1) translation, readability test, and content validation test, (2) psychometric test using Internal Consistency Reliability and Test and Re-test Analysis. This instrument has three dimensions, namely

- 1) Measuring a person's confidence in exercising 150 minutes per week (not in one time),
- 2) Measuring a person's confidence in exercising three times per week for 20 minutes,
- 3) Measuring confidence a person in exercising 3x a week for at least 40 minutes each session.

This instrument has a Cronbach value of 0.84 with a reliability value using tests and re-tests showing intraclass correlation results of 0.53 to 0.87 for all items, which

means that the reliability of the questionnaire is in the moderate to very good range.

Instrument Outcome Expectation

The outcome expectation variable adapts the instruments compiled by [10,22,24–27], adapted to the language and characteristics of the elderly in Indonesia. This instrument was adapted using a cross-cultural technique [28] covering two processes, namely (1) translation, readability test, and content validation test, (2) psychometric test using Internal Consistency Reliability and Test and Re-test Analysis. This instrument measures a person's belief about the achievement of sports results. This instrument was in early development aimed at predisposed adults and elderly people with low expectations of the benefits of exercise. This questionnaire has 9 positive statement items and 4 negative statement items, with a choice of responses on a 5-point Likert scale from 1 'Strongly Disagree' to 5 'Strongly Agree'—this instrument. The validation of this instrument resulted in Cronbach's alpha of 0.92 with a reliability value using tests and re-tests showing intra-class correlation results of 0.53 to 0.86 for all items, which means that the reliability of the questionnaire is in the range of moderate to very good.

Instrument Body Mass Index

Calculation of body mass index or Body Mass Index (BMI) uses a method that is often used with the following calculations:

$$BMI = \frac{Weight (kg)}{Height^2 (m)}$$

The formula calculation result is then seen how the BMI value is concluded for our body category, whether it is thin, ideal or normal, or fat/overweight/obese [29].

Table 1. Descriptive data per BMI category (mean standard ± deviation)

	Underweight	Healthy Weight	Overweight	Obesity	Total
N	5	57	39	17	118
Age (years)	59.6 ± 9.0	63.7 ± 8.6	59.3 ± 7.6	60.8 ± 7.4	61.7 ± 8.3
Height (cm)	156.5 ± 5.3	153.1 ± 8.5	153.7 ± 8.5	154.8 ± 8.1	153.7 ± 8.3
Weight (kg)	43.44 ± 4.2	52.9 ± 6.8	65.3 ± 8.2	79.7 ± 10.7	60.5 ± 12.7
BMI (kg/m ²)	17.71 ± 0.9	22.5 ± 1.8	27.5 ± 1.2	33.3 ± 3.7	25.5 ± 4.6

Table 2. Category BMI

Score BMI	Weight Status
Below 18.5	Underweight
18.5-24.9	Healthy Weight
25.0-29.9	Overweight
30.0 and Above	Obesity

Data Analysis

Proof of the research hypothesis using the Pearson Product Moment correlation technique using the SPSS 25 for windows program. Data analysis was also conducted to determine the individual's self-efficacy and outcome expectations by categorizing the total score of each questionnaire. The categorization is performed using ordinal level categorization into four categories: shallow, low, high, and very high categories for variables. The following is the research score categorization formula:

Table 3. Score Category Formula

Score Category	Score Category Formula
Very low	$x \leq \mu - 1.5\sigma$
Low	$\mu - 1.5\sigma < x \leq \mu$
High	$\mu < x \leq \mu + 1.5\sigma$
Very High	$\mu + 1.5\sigma < x$

Information: μ = mean value; σ = standard deviation

3. Result

The data that has been collected is then processed and analyzed. Processing the cross-tabulation between self-efficacy and outcome expectation with BMI yielded the following results:

In self-efficacy dimension 1 on BMI produces a value, in the very low category 7 (5.9%) elderly have healthy weight status, 8 (6.8%) elderly are overweight, and 1 (0.8%) elderly are obese. In the low self-efficacy category, 1 (0.8%) elderly have underweight status, 18 (15.3%) elderly are a healthy weight, 17 (14.4%) are overweight, and 8 (6.8%) are obese. In the high self-efficacy category, there are 1 elderly who have underweight BMI status, 25 elderly are a healthy weight, 13 elderly are overweight, and 8 elderly are obese. Elderly who have very high self-efficacy with BMI status underweight are 3 (2.5%) elderly, healthy weight 7 (5.9%), elderly, overweight 1 (0.8%), and 0 elderly experiencing obesity.

In the 2nd dimension of self-efficacy to BMI produces a value, in the very low category 4 (3.4%) elderly have healthy weight status, 3 (2.5%) elderly are overweight and

2 (1.7%) elderly experience obesity. The elderly who have low self-efficacy have an underweight BMI status of 1 (0.8%) elderly, 18 (15.3%) healthy weight elderly, 20 (16.9%) overweight elderly, and 8 (6.8%) elderly experiencing obesity. In the high category of self-efficacy, there are 3 (2.5%) elderly have underweight BMI status, 31 (26.3) elderly are a healthy weight. 15 (12.7%) elderly are overweight, and 6 (5.1%) elderly are obese. The elderly who have very high self-efficacy with BMI underweight amounted to 1 (0.8%) elderly, healthy weight 4 (3.4%) elderly, overweight 1 (0.8%), and 1 (0.8%) elderly experienced obesity.

In the 3rd dimension, self-efficacy towards BMI produces a value, in the very low category 1 (0.8%) elderly in the overweight category and 2 (1.7%) elderly experiencing obesity, elderly who have very low self-efficacy who get a BMI in the underweight category and healthy weight is 0. The elderly who have low self-efficacy with BMI in the underweight category are 2 (1.7%) elderly, 23 (19.5%) healthy weight elderly, 22 (18.6%) overweight, and 8 (6.8%) of the elderly experience obesity. In the high self-efficacy category, 1 (0.8%) elderly have a BMI in the underweight category, 27 (22.9%) healthy weight elderly, 15 (12.7%) overweight elderly, and 7 (5.9%) elderly experiencing obesity. The elderly who have very high self-efficacy with BMI status underweight are 2 (1.7%) elderly, healthy weight 7 (5.9%) elderly, overweight 1 (0.8%), and no elderly experience obesity.

In the variable, the outcome expectation (positive) on BMI produce a value, in the very low category 1 (0.8%) elderly in the healthy weight category, 1 (0.8%) elderly in the overweight category, and 3 (2.5%) elderly experiencing obesity. The elderly who received the benefits of exercise in the low category associated with BMI in the underweight category were 2 (1.7%) elderly, 29 (24.6%) healthy weight elderly, 28 (23.7%) overweight, and 8 (6.8) elderly. %) elderly experience obesity. In the high category exercise benefits, there are 2 (1.7%) elderly have BMI in the underweight category, 24 (20.3%) healthy weight elderly, 8 (6.8%) overweight elderly, and 5 (4.2%) elderly experiencing obesity. The elderly who received very high exercise benefits when associated with BMI in the underweight category were 1 (0.8%) elderly, healthy weight 3 (2.5%) elderly, overweight 2 (1.7%), and 1 (0.8%). %) elderly experience obesity.

The variable outcome expectation (negative) on BMI produces a value, in the very low category 0 (0%) elderly in the underweight, healthy weight and obese category, and 1 (0.8%) elderly in the overweight category. The elderly who received the benefits of exercise (outcome expectation) in the low category associated with BMI in the underweight category were 4 (3.4%) elderly, 42 (35.6%) healthy weight elderly, 4 (3.4%) overweight, and 5 (4.2) elderly. %) elderly experience obesity. In the high category of sports benefits, 1 (0.8%) elderly have a BMI in the underweight category, 15 (12.7%) healthy weight elderly, 27 (22.9%) overweight elderly, and 5 (4.2%) elderly experiencing

obesity.

The elderly who receive very high benefits of exercise (outcome expectation) when associated with BMI in the underweight and healthy weight categories are 0 (0%) elderly. In comparison, the elderly who have a BMI underweight and obesity are 7 (5.9%) elderly.

Furthermore, the proof of the research hypothesis in this study uses the Pearson product-moment correlation technique with the following results:

Based on table 4, there is a significant negative relationship between self-efficacy dimension 1 and BMI because of sig value. < 0.05, r count is negative and r count < r table -0.1809 (negative). The correlation test results showed that there were 25 people (21.2%) who had high self-efficacy and had an ideal BMI (Healthy Weight). Departing from the categories made by experts, someone who has an ideal body weight is neither underweight (underweight) nor overweight (overweight and obesity).

Based on table 5, there is a significant negative relationship between self-efficacy dimension 2 and BMI because of sig value. < 0.05, r count is negative and r count < r table (-0.203 < 0.1809) (negative). The correlation test results can be concluded that there are 31 people (26.3%) who have high self-efficacy and have an ideal BMI (Healthy Weight). Departing from the categories made by experts, someone who has an ideal body weight is neither underweight (underweight) nor overweight (overweight and obesity).

Based on table 6, there is a significant negative relationship between self-efficacy in dimension 3 and BMI because of sig value. < 0.05, r count is negative and r count

< r table -0.278 < -0.1809 (negative). The correlation test results can be concluded that there are 27 people (22.9%) who have high self-efficacy and have an ideal BMI (Healthy Weight). Departing from the categories made by experts, someone who has an ideal body weight is neither underweight (underweight) nor overweight (overweight and obesity).

Based on table 7, there is a significant negative relationship between the outcome expectation (positive) and BMI because of sig value. < 0.05, r count is negative and r count < r table -0.205 < 0.1809 (negative). The results of the correlation test can be concluded that there are 31 people (26.3%) who have a high understanding of the outcome expectation (positive) and have an ideal BMI (Healthy Weight). Departing from the categories made by experts, someone who has an ideal body weight is neither underweight or overweight and obesity.

Based on table 8, there is a significant positive relationship between the outcome expectation (negative) and BMI because of the value of sig. < 0.05, r count is positive and r count > r table (0.523 > 0.1809) (positive). The correlation test results can be concluded that there are 42 people (35.6%) who have an ideal BMI and have a low (negative) understanding of the outcome expectation. These results show that being too ambitious and the body's stress level that accumulates in achieving the ideal body weight make a person overweight or obese. Because exercise takes time and is consistent with achieving maximum results, as Bompa said [30], exercise or sport has principles, one of which is progressive, overload, individual, readiness, measurable, etc.

Table 4. Correlations of Self Efficacy dimension 1 with BMI

		BMI	Self-efficacy dimension 1
BMI	Pearson Correlation	1	-.213*
	Sig. (2-tailed)		.021
	N	118	118
Self-efficacy dimension 1	Pearson Correlation	-.213*	1
	Sig. (2-tailed)	.021	
	N	118	118

*. Correlation is significant at the 0.05 level (2-tailed)

Table 5. Correlations of Self Efficacy dimension 2 with BMI

		BMI	Self-efficacy dimension 2
BMI	Pearson Correlation	1	-.203*
	Sig. (2-tailed)		.028
	N	118	118
Self-efficacy dimension 2	Pearson Correlation	-.203*	1
	Sig. (2-tailed)	.028	
	N	118	118

*. Correlation is significant at the 0.05 level (2-tailed)

Table 6. Correlations of Self Efficacy dimension 3 with BMI

		BMI	Self-efficacy dimension 3
BMI	Pearson Correlation	1	-.278**
	Sig. (2-tailed)		.002
	N	118	118
Self-efficacy dimension 3	Pearson Correlation	-.278**	1
	Sig. (2-tailed)	.002	
	N	118	118

** . Correlation is significant at the 0.01 level (2-tailed)

Table 7. Correlations of the outcome expectation dimension 1 with BMI

		BMI	Outcome expectation (positive)
BMI	Pearson Correlation	1	-.205*
	Sig. (2-tailed)		.026
	N	118	118
Outcome expectation (positive)	Pearson Correlation	-.205*	1
	Sig. (2-tailed)	.026	
	N	118	118

*. Correlation is significant at the 0.05 level (2-tailed)

Table 8. Correlations of the outcome expectation dimension 2 with BMI

		BMI	Outcome expectation (negative)
BMI	Pearson Correlation	1	.523**
	Sig. (2-tailed)		.000
	N	118	118
Outcome expectation (negative)	Pearson Correlation	.523**	1
	Sig. (2-tailed)	.000	
	N	118	118

** . Correlation is significant at the 0.01 level (2-tailed)

4. Discussion

This study aims to determine the relationship between Self-Efficacy and expectations of the benefits of exercise (Outcome Expectation) on Body Mass Index in the elderly population, especially those in Yogyakarta, Indonesia.

The decreased cognitive function is associated with increasing age. An increasing problem in the elderly aged 50 – 65 years [31], one of which occurs in the Asian region and Indonesia. The preventive step that can be chosen is to do a physical activity because it has been proven to slow down the decline in cognitive abilities with age. Awareness of the relationship between physical activity and health, interaction with professionals in the health sector, expectations of cultural and social conditions, the need for vacant land to carry out physical activity are the main factors for the obstacles experienced by the elderly. So that

as people get older, it takes the intervention of people around them to increase participation in physical activity in the elderly that can be accepted and accessed easily [32].

Older adults with social support have been shown to have lower blood pressure [33], lower mortality [34], and improved cognitive function [35]. The positive effect of the elderly who do physical activity will be very useful for the socio-psychological aspect with the recognition given by the surrounding environment. That way, the elderly have the confidence to carry out various kinds of physical activities even with low-moderate intensity.

Previous studies researched the relationship between balance ability, which decreases when body weight increases [36], then a study in Japan explains that in healthy elderly people, there will be a negative relationship between body fat levels and waist circumference [37]. The meaning of a healthy elderly in the statement is the

condition of the elderly who has a normal or ideal BMI category. The results of this study link BMI to self-efficacy and understanding of the benefits of exercise (outcome expectation) for an elderly person. The results showed a very significant relationship between self-efficacy and BMI and followed by the relationship between understanding the benefits of exercise (outcome expectation) and BMI also had a significant relationship. With the belief that the elderly can carry out physical activity and understand what benefits will be obtained after doing physical activity, the elderly will live an active life in sports or physical activity.

The elderly with poor food intake will be associated with overweight or obesity conditions [38]. On the psychological side, a positive relationship appears between depression and BMI. Lower or higher body weight, below or above normal, will cause an increase in depression in elderly men, but the effect is low in elderly women [39]. Kim, Yun-Jeong [40] suggested no difference in physical health between divorced and married elderly. However, a study conducted by [41] stated that divorced people had a higher mortality rate and poorer physical health than married people. So, it can be concluded that not only from self-confidence and knowledge of the benefits of exercise, aspects of food intake and psychology also affect the condition of the elderly (outcome expectation).

The more fat deposits and the increase in waist width, in other words, interpreted as BMI in the overweight and obese categories, will be positively correlated with the possibility of being vulnerable to the risk of falling. However, in healthy elderly people, the BMI is in the ideal or normal category, with fat conditions and waist circumference. Which is normal, then one of the benefits will be minimized—risk for falls, effects of decreased balance and body stability [36], [37]. Besides health problems such as a higher risk of falling in the elderly, hypertension or high blood pressure is a disease that also often occurs in the elderly and can cause heart disease and stroke [42]. However, by exercising regularly and understanding the benefits of exercise, the elderly can reduce their chances of having these health problems.

Therefore, the better the understanding of the benefits of exercise (outcome expectation) and the self-efficacy to carry out physical activity, the better the correlation with the ideal body condition of the elderly. Regarding BMI and mortality, those who have the lowest mortality during the 20 years of the study are the elderly with normal BMI compared to underweight, overweight, and obese [43].

5. Conclusions

Based on the results of this study, it can be concluded that the elderly who have high self-efficacy will have an ideal BMI (Healthy Weight), not (Underweight) or overweight (Overweight and Obesity). Then the elderly who understand the benefits of exercise (outcome

expectation positive) are high will have an ideal BMI (Healthy Weight), not (Underweight) or overweight (Overweight and Obesity). Moreover, vice versa the elderly with an understanding of the benefits of exercise are low will have a BMI Underweight or heavy overweight and obesity. Therefore, self-efficacy in doing physical activity and understanding the benefits obtained after doing sports have a significant relationship with BMI values in the elderly. It is suggested that further research can be carried out by adding variables related to the topic of this research, such as the relationship with fat levels, diseases related to ageing, other psychological variables related to social groups, etc.

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