www.ijemst.net

Psychological-based Physical Exercise Education Model for Improving Elderly Physical Fitness

Cerika Rismayanthi
Universitas Sebelas Maret, Indonesia

Sugiyanto
Universitas Sebelas Maret, Indonesia

Agus Kristiyanto
Universitas Sebelas Maret, Indonesia

Muchsin Doewes
Universitas Sebelas Maret, Indonesia

To cite this article:

Rismayanthi, C., Sugiyanto, Kristiyanto, A., & Doewes, M. (2022). Psychological-based physical exercise education model for improving elderly physical fitness. *International Journal of Education in Mathematics, Science, and Technology (IJEMST), 10*(1), 162-174. https://doi.org/10.46328/ijemst.2182

International Journal of Education in Mathematics, Science and Technology

2022, Vol. 10, No. 1, 162-174 https://doi.org/10.46328/ijemst.2182

Psychological-based Physical Exercise Education Model for Improving Elderly Physical Fitness

Cerika Rismayanthi, Sugiyanto, Agus Kristiyanto, Muchsin Doewes

Article Info

Article History

Received:
28 April 2021
Accepted:
03 November 2021

Keywords

Physical activity
Elderly
Questionnaire
Validity
Reliability

Abstract

Increasing age that helps everyone will lead to the elderly group being vulnerable to various activities because of the decline in physiological functions. On the other hand, the elderly have to be able to survive. In addition to the psychological aspects, aspects of muscle, cardiovascular, balance, and mobility are essential factors to support the body's work. Measurements in this study using Delphi Technique towards a psychological-based physical exercise education model to improve physical fitness. The majority of validity tests are more significant than critical 0.30, so the Delphi technique is valid. In the reliability test, the calculated values of Cronbach's Alpha were 0.889 and 0.741, indicating that various questions about the use of the Delphi technique were reliable or consistent. It can be concluded that applied Delphi Technique as a psychological-based physical exercise education model to improve physical fitness for the elderly stated valid and reliable.

Introduction

The final development period in human life is the elderly. The development in question is psychological development. The end goal is to achieve integrity in a person. The 21st century is the age of the elderly (the era of population aging). All forms of changes experienced by the elderly are usually referred to as aging, and these changes will affect physical fitness and mental health, emphasizing more on psychological factors. The last development period in human life is in the old ages. Called development here does not mean development as experienced by adolescents. What is meant is psychological and social development. In this case, the development task in the elderly is the achievement of integrity in a person. It means that he managed to fulfill commitments in relations with himself and others, accepting the continuation of his age, accepting the limitations of his physical strength, maybe also accepting the illness he suffered. Instead, he can also accept other people's treatment of himself, reflecting his treatment of other people. If a person cannot achieve integrity, then he will experience discouragement. In addition, the task of developing the elderly is about moral commitment. The elderly should commit to feeling capable and have mastery of what they face. Finally, the three commitments mentioned above are good in the struggle for life physically, economically, and

psychologically. So it takes psychological abilities in the lives of the elderly to support a variety of skills in old age.

In the life span, old age is marked by specific physical and psychological changes. As an effect of these changes, most elderly will become excellent and healthy individuals with all social adjustments. Physical aging usually precedes mental aging, although sometimes the opposite, especially when the individual begins to feel old and ignore the signs of physical aging, such as when the strength, speed, balance, and cardiovascular endurance begin to weaken because they do not consider those signs important. Individual attitudes are influenced by psychological factors such as individual personality traits, motivations, thoughts, feelings, experiences, knowledge, obstacles experienced in life, and other environmental influences. Psychology reveals that sensory, motor, and perception on processes influence thoughts, feelings, and behavior (Kiik et al., 2018). Psychological phenomena reflect a person's behavioral domain embodied in basic physical concepts and experiences that affect a particular individual or group's cognitive, emotional, and behavior (Elsegood & Wongpakaran, 2012). An elderly person who successfully fulfills commitments in relationships with himself and others accepts aging, accepts the limitations of his physical strength, may also accept the disease he suffers (Szarota & Mackowicz, 2015).

On the other hand, the elderly can also receive any treatment of others, reflecting his treatment of others long ago. If a person cannot obtain integrity, then he will experience despair. While to overcome anxiety, the statement was obtained that there is a potential relationship to exercise as therapy for depression or anxiety. They are using physical activity to improve quality of life by strengthening self-esteem, improving mood, reducing anxiety, resisting stress, and improving sleep quality. So it is required for the elderly to involve physical activity in aspects of improving their lives.

Elderly aged 50 - 65 years old (WHO, 2016) experience various kinds of decreased physiological function, including muscle function, cardiovascular. Muscle strength and power in performing isometric, concentric, and eccentric movements decreased since the age of 40 years, and a significant decrease occurred after the age of 65-70 years old. Then the balance and mobility factors also decrease when they reach that age. Based on these considerations, various kinds of movements are needed following the elderly needs. It is certainly cannot be equated with the usual movements carried out by people who are productive in the golden age. Another aspect of elderly development is about moral commitment. Seniors should commit to feeling able and having mastery of what they face (Birren et al., 2006). Lastly, the three commitments are above both concerning fighting for life physically, economically, and psychologically. One of the solutions needed is to have psychological skills in elderly life to support various skills in old age.

The elderly must have a passion for life. In a meta-analysis review, there is a link between psychological abilities and anxiety that envelops the minds of many elderly (Elsegood & Wongpakaran, 2012; Hassanijirdehi et al., 2015). Moreover, to overcome anxiety, it is stated that there is a potential link to exercise as a therapy of depression or anxiety, and the use of physical activity as an ingredient to improve quality of life (Hassanijirdehi et al., 2015) through strengthening self-esteem, improving mood, reducing anxiety, resistance to stress and

improving sleep quality (d'Arbeloff, 2020; Eckstrom et al., 2020; Hwang & Sim, 2020; Song et al., 2020; Yeh et al., 2020). So the elderly must involve physical activity in the aspect of improving their lives.

By having a healthy body and mind, one can contribute to sports activities. Sports psychology contains dimensions of human action and behavior. The motor, cognitive, and affective components play a critical role in producing various movement patterns in sports activities, aiming to improve the state of a healthy body (Jehu et al., 2017; Odden et al., 2015; Rudd et al., 2020). Body and mind are a unity that cannot be separated. They have elements that influence each other. Preliminary and literature studies are carried out as a brief introduction to the product to be developed. It is done to collect findings in the field based on the need for information related to the product development that will plan.

The first step in this development research is to find the root of the problem and discover the potential, strengths, and weaknesses of various psychological-based physical exercises in improving physical fitness for the elderly. Preliminary studies conducted include needs analysis, literature study, a literature study on physical exercise for the elderly carried out and developed in the community. In conducting a needs analysis, there are several criteria related to the urgency of product development, including the availability of competent human resources (according to their field). Developing physical exercise products for the elderly to improve psychological-based physical fitness should be based on the needs of the elderly. The fitness instructors should provide physical exercise models that are easy, fun, and can be done anywhere at any time and following the condition of the elderly in the community.

Elderly, according to Indonesia Law No. 13 of 1998, explains that aged 60 years, on the other hand, the international world recognizes seniors aged about 50 - 65 years (WHO, 2016). At this age, the elderly experience a variety of decreased physiological functions, including muscle function, cardiovascular. Muscle strength and power in performing isometric, concentric, and eccentric movements decreased from 40 years, and significant decreases occurred after the age of 65-70 years (Porcari et al., 2015). The body's ability to balance and mobility also decreases when the elderly age (Messier et al., 1997; Porcari et al., 2015; Yamada & Demura, 2009). For various kinds of physiological decline, it takes a variety of movements that suit the needs of the elderly.

Indeed, they cannot equate it with the usual movements made by productive people in the golden age. The guide model of physical exercise based on psychological in improving physical fitness can motivate the elderly to do physical exercise independently or in groups. It makes the body healthier, not quickly tired, and aches in daily activities make feelings calmer, relaxed, and fresh. Communication and socialization with fellow elderly remain intertwined either do not feel lonely, have friends exchange stories and reduce anger and emotions more controlled.

Several processes must be completed to get cooperative movement for the elderly. In the beginning, searching, finding, and implementing theoretically and empirically from previous studies to identify problems older adults face, including field study and need assessment. The next step was an early product of a training model for the

elderly, so the prototype research model was created at the beginning of the research flow. Therefore, validation from experts is required to know how effective the application of the Delphi Technique is in improving the physical fitness of the elderly. On the other hand, it can help the elderly be confident and perform various basic daily activities.

Method

This study uses mixed methods (Ary et al., 2010) to complement each other's qualitative and quantitative data obtained. Qualitative data is obtained through interviews with the elderly and quantifiable data through descriptive studies using questionnaires or "Movement Screening for the Elderly" instruments. Questionnaires are used to have any exercise movements appropriate for the elderly and are at less risk of injury or body imbalance that can lead to falls in the elderly. Questionnaires are distributed through expert validation in the academic field. Still, expert validation is required as a practitioner so that all the movements can be applied in daily physical activities for the elderly. There are two expert validation measurements in this Delphi Technique measurement through two stages, the first and the second stage. The first stage consists of 14 questions, and the second stage has as many as 18 questions. Data collection from expert validators is intended for validity in using Delphi techniques against psychological based physical exercise education models to improve physical fitness for the elderly.

Data Processing

This study aims to develop a psychological-based physical exercise education model to improve physical fitness for the elderly. The expert validation stage needs to be carried out to produce a feasible training model. There are several techniques used in the validation of an exercise model. This study uses the Delphi technique to validate the developed exercise model. Researchers make plans so that expert validation with the Delphi technique approach goes well. The fitness and physical activity expert validation questionnaire carried out a reliability test. The number of questions was 14 items (n = 14), with a Cronbach's Alpha value of 0.761. Because the Cronbach's Alpha value is 0.761 > 0.60, it concludes that the questionnaire for the assessment of fitness and physical activity experts is consistent or reliable. As for the validity test using Pearson Correlation with r-table value = 0.532 (n = 14). The value of r_{table} determines whether or not the question is valid as the limit of numbers and the results of statistical calculations (rxy). Questionnaire data obtained is then analyzed using IBM Statistics 20 using validity test (Pearson Correlation) and reliability test (Cronbach's Alpha). After the calculation is completed, results are obtained to explain data from Delphi techniques against psychological based physical exercise education models to improve physical fitness for the elderly.

Results

Questions were made of 14 and 18 components in the first and second stages to determine if Delphi techniques against psychological-based physical exercise education models to improve physical fitness for the elderly. The existing data then conducted validity test experts in Table 1 and 2 to determine the suitability of techniques

against the training model. This validity test obtained data from 6 validators in the first stage and five validators in the second stage.

Table 1. The First Stage of Delphi's Technique

No	r_{count}	r_{table} 5%	$r_{critical}$	Criteria (r_{table})	Criteria ($r_{critical}$)
1	0.937	0.576	0.3	Valid	Valid
2	0.937	0.576	0.3	Valid	Valid
3	0.555	0.576	0.3	Invalid	Valid
4	0.000	0.576	0.3	Invalid	Invalid
5	0.292	0.576	0.3	Invalid	Valid
6	0.754	0.576	0.3	Valid	Valid
7	0.390	0.576	0.3	Invalid	Valid
8	0.492	0.576	0.3	Invalid	Valid
9	0.555	0.576	0.3	Invalid	Valid
10	0.561	0.576	0.3	Invalid	Valid
11	0.682	0.576	0.3	Valid	Valid
12	0.623	0.576	0.3	Valid	Valid
13	0.813	0.576	0.3	Valid	Valid
14	0.368	0.576	0.3	Invalid	Valid

Table 2. The Second Stage of Delphi's Technique

No	r_{count}	r_{table} 5%	$r_{critical}$	Criteria (r_{table})	Criteria ($r_{critical}$)
1	0.238	0.497	0.3	Invalid	Invalid
2	0.725	0.497	0.3	Valid	Valid
3	0.725	0.497	0.3	Valid	Valid
4	0.236	0.497	0.3	Invalid	Invalid
5	0.725	0.497	0.3	Valid	Valid
6	0.236	0.497	0.3	Invalid	Invalid
7	0.000	0.497	0.3	Invalid	Invalid
8	0.000	0.497	0.3	Invalid	Invalid
9	0.471	0.497	0.3	Invalid	Valid
10	0.672	0.497	0.3	Valid	Valid
11	0.000	0.497	0.3	Invalid	Invalid
12	0.264	0.497	0.3	Invalid	Invalid
13	0.904	0.497	0.3	Valid	Valid
14	0.704	0.497	0.3	Valid	Valid
15	0.532	0.497	0.3	Valid	Valid
16	0.904	0.497	0.3	Valid	Valid
17	0.904	0.497	0.3	Valid	Valid
18	0.904	0.497	0.3	Valid	Valid

Using the r_{table} of 5% significance, there are as many as six valid and eight invalid questions in the first stage, while in the second stage, there are 8 valid and invalid questions. Valid and invalid determination is determined by r_{table} with significance 5% using df (degree of freedom) = n-2, in the first stage, df = 12 and the second stage, df = 16. Although decision making in the correct item validity test total correlation at a significance of 5%, there is a provision that the lower limit of critical r 0.30. With the calculation result of 13 valid questions and 1 invalid in the first stage, the second stage has as many as 11 valid questions and 7 invalids. It concludes that the most valid questions will be obtained, so Delphi's technique towards the Psychological Based Physical Exercise Model to Improve Physical Fitness for the Elderly is considered valid.

Reliability Test

This test is intended to determine the consistency in questioning Delphi techniques of psychological-based physical exercise education models to improve physical fitness for the elderly. The decision making in reliability test is as follows:

1. If the value of Cronbach's Alpha is more than 0.60 then the questionnaire or questionnaire is reliable or consistent
2. If Cronbach's Alpha value is less than 0.60, the questionnaire is not reliable or inconsistent.

The first and second stage reliability test results are given in Table 3.

Table 3. First and Second Stage Reliability Test

Stage	Analysis	Value
First Stage	Cronbach's Alpha	.889
Second Stage	Cronbach's Alpha	.741

With Cronbach's Alpha values in the first and second stages, i.e. 0.889 > 0.60 and 0.741 > 0.60, it concludes that various questions regarding existing exercises are considered reliable or consistent.

Discussion

Physical activity has a vital role in preventing the decline of the body's ability in the elderly, maintaining bodily functions, reducing risk factors for disabilities, helping in checking for chronic pain such as heart disease, diabetes, arthritis, or some types of cancer and the development of quality of life (Cress et al., 2004; Moisescu, 2014; Song et al., 2020). However, due to the massive risk of falls in the elderly (Yamada & Demura, 2009), it takes a lot of training movements suitable for the elderly to support all daily movement activities. The increase in age experienced by everyone will lead them to enter the elderly age group, making it difficult to do various activities due to a decrease in physiological function.

In addition to the psychological aspects, the aspects of muscle ability, cardiovascular, balance, and mobility are essential factors to support the body's work and maintain the health of the elderly in general. The American

College of Sports Medicine and WHO recommends doing moderate-intensity physical exercise for more than 150 minutes per week or actively doing 75 minutes of vigorous-intensity physical exercise per week (World Health Organization, 2020). Physical exercise has a vital role in preventing the decline of the body's abilities at a young age (Al-Khudairy et al., 2017; Mead et al., 2017; Mohammadi et al., 2019), maintaining body functions, reducing risk factors for disability, helping in checking chronic diseases such as heart disease, diabetes, arthritis, or some types of cancer, and improving quality of life. However, due to the high risk of falling in the elderly, many exercise movements are needed that are suitable for the elderly to support all daily movement activities. Some of the factors faced by the elderly that significantly affect mental health are as follows: (1) Decrease in Physical Condition; (2) Decreased Sexual Function and Potential; (3) Changes in Psychosocial Aspects; (4) Work-Related Changes; (5) Changes in Social Roles in Society; and (6) Decrease in Physical Condition.

Increased age experienced by each person will end with the elderly age group, which is vulnerable to various activities due to physiological function decrease. Instead of socio-psychological aspects, muscular function, cardiovascular, balance, and mobility aspects are important factors that support our body's work. The habit of physical activity is carried out routinely three times a week. However, having limited space for activities and rarely using additional tools when physical activity, the elderly experience increased exercise load. Still, they feel muscle pain, stiffness, joint pain, pain when bending, aches, panting. Therefore, the elderly want to practice with slow movements, more fun, more elderly involved to communicate and fresher the mind. So far, the elderly think there is no model of physical exercise involving sociological and psychological aspects. Obstacles faced by the elderly include jumping, bending, lifting weights, and coordinating foot and hand movements simultaneously.

Therefore, a questionnaire about the validity and reliability of the questionnaire on Delphi techniques for the elderly was conducted so that when the activity does not occur, malpractice can be dangerous, such as falls, injuries, and impropriety in moving. Accessible falls are closely related to body imbalance. The greater a person's weight, the worse his body balance ability (Gao et al., 2019). Physical exercise improves life quality through cardiovascular ability, balance, strength, flexibility, and good body composition (Birditt et al., 2014; Eckstrom et al., 2020; Klassen et al., 2017; Ribeiro et al., 2020). It is also used to strengthen self-esteem, improve mood, reduce anxiety, resist stress, and improve sleep quality. For these considerations, various kinds of movements are needed that suit the needs of the elderly (de Melker Worms et al., 2017). It cannot be equated with the usual movements for productive people. The elderly thought that there was no physical exercise model that involved psychological aspects.

The obstacles faced by the elderly include jumping movements, bending movements, lifting weights, and coordinating foot and hand movements simultaneously. When the activities were given, there were no malpractices that could be dangerous, such as falls, injuries, and inability to move. Therefore, testing the validity and reliability of the exercise movement screening questionnaire for the elderly was carried out. From the results of the development of the movement draft, the movement model of physical exercise for the elderly to improve psychological-based physical fitness is obtained. Choosing the appropriate physical exercise for the elderly should be programmed (Kenney et al., 2015). The exercise should have to be adjusted its frequency,

intensity, type, and time (FITT). It should be done regularly three times/week, have low-moderate intensity, simple, easy movements, and especially a fun movement and can create a cheerful and happy atmosphere.

Physical exercise that is usually done has not had a combination following the principles of exercise of Frequency, Intensity, time, and type recommended for the elderly (Porcari et al., 2015). So, there are special programs and techniques for instructors to help the elderly do physical activities. In addition to the unavailability of additional tools and facilities in physical exercise, there is still limited variation in movement during exercise. The elderly have difficulty participating in physical exercise programs. It is difficult for elderly gymnastics instructors to increase the intensity and burden of exercise for the elderly. No physical exercise model or mental health exercise emphasizes psychological factors that make the elderly excellent and healthy individuals with all social adjustments. There are still no special exercise programs for the elderly to improve physical fitness, valid, effective, and practical.

Fitness components in training the elderly include aerobic ability, balance, endurance, strength, flexibility, and speed. Of course, when the instructor must supervise performing movements, they cannot do it alone due to the high risk of falls (Gao et al., 2019; Yamada & Demura, 2009). For example, the ability to balance will be reduced when weight gain. A study in Japan explained that in healthy elderly, a negative relationship would be obtained to fat and waist circumference (Ito et al., 2019). In other words, the more fat deposits and the width of the waist environment will be positively correlated to the possible risk of falling elderly (Gao et al., 2019).

Still, healthy elderly with normal fat and waist circumference conditions will minimize the risk of falling. The flexibility in moving for the elderly in physical activity is one of the supporting factors for motion progress. However, there is no denying that the elderly have difficulty in making some movements. This situation results in the practitioner choosing how to perform many repetitions, assisting in completing the movement, and making the movement more straightforward, followed by adding weights from one session to the next. During the interview, the elderly mentioned that as people try, they prefer to do exercises with easy-to-do movements coupled with the form of the game.

Weight training performed by the elderly is very beneficial in maintaining muscle mass (Granic et al., 2019) and muscle strength (Fisher et al., 2014; Miller et al., 2021). The purpose of strength training should be to pay attention to the specifics of choosing which muscles to focus on during exercise (Ribeiro et al., 2020). Recommendations for strength training for the elderly are still carried out twice a week, in addition to aerobic exercise with a frequency of three times a week (World Health Organization, 2020). Strength training can minimize the risk of falling in the elderly, and one simple form is walking (de Melker Worms et al., 2017; Sawada et al., 2017). Walking has been shown to help reduce the risk of falling and train the lower body muscles (Gao et al., 2019). For the elderly who are used to going to the gym, very physically active parents will tolerate high-intensity weight training once or twice a week without reducing the essence of excitement (McArdle et al., 2018). The third form of exercise is balance. Balance training and strength training helps to minimize the risk of falling (Cress et al., 2004; Eckstrom et al., 2020; Seco et al., 2013).

Research clearly shows that physical activity has a significant contribution to the function of the central nervous system, including the elderly. Balance and strength are essential for the elderly above other bio-motor training goals (Porcari et al., 2015). Without these two things, parents experience deficiencies or difficulties in carrying out basic daily activities. Independence is lost, the level of self-confidence also decreases (Eckstrom et al., 2020). As a solution, regular exercise should be done to help the nervous system work in the elderly to stay awake, such as streamlining movement and reaction time(Jehu et al., 2017; Lin et al., 2019). Studies show that the elderly who are trained have a faster reaction time than the elderly who are not trained and can continue to improve if they continue to be trained (Lin et al., 2019).

In various previous studies, physical activity will provide health benefits for the elderly and maintain the function of the body independently (Cress et al., 2004; Dale et al., 2014; Evans & Grimby, 1995; Woodcock et al., 2011), improve their quality of life (Cress et al., 2004), improve the stabilization of posture and road patterns in the elderly in reducing the incidence of frequent falls (Messier et al., 1997). In addition to the physical aspect, the elderly also need support from the socio-psychological aspect (Kaufman & Wolff, 2010). With the social support of the surroundings, the elderly will have low blood pressure (Birditt et al., 2016), lower mortality rates (Holt-Lunstad et al., 2010), and improve cognitive function (Gow et al., 2013).

Many practitioners argue that there has been no physical exercise that combines the socio-psychological aspect with physical activity. The models of physical exercise recommended by the instructors include low-intensity physical activity - being performed regularly three times a week, easy, fun, and straightforward movements, prioritizing balance and strength. Table 1 and 2 describe how the Delphi techniques are considered valid. Table 3 describes the reliability of validation results that can be synthesized about the usefulness of techniques for which can be accounted.

Conclusion

The administration of the Delphi Technique against psychological-based physical exercise education models to improve physical fitness for the elderly is declared valid and reliable. Delphi Technique can be used for the development of training models for the elderly. We tried to summarize what forms of exercise can be helpful for the elderly. The facts show that long-term exercise consisting of weight training, balance, and functional training greatly benefits older people. We know that anyone is recommended to stretch after waking up and before going to bed for all ages. However, many do not realize the benefits of doing light movements that can be done anywhere, for example, on the bed when they wake up or before going to bed.

References

Al-Khudairy, L., Loveman, E., Colquitt, J. L., Mead, E., Johnson, R. E., Fraser, H., Olajide, J., Murphy, M., Velho, R. M., O'Malley, C., Azevedo, L. B., Ells, L. J., Metzendorf, M. I., & Rees, K. (2017). Diet, physical activity and behavioural interventions for the treatment of overweight or obese adolescents aged 12 to 17 years. *Cochrane Database of Systematic Reviews*, *6*.

https://doi.org/10.1002/14651858.CD012691

Ary, D., Jacobs, L. C., Sorensen, C., & Razavieh, A. (2010). *Introduction to Research in Education, Wadsworth Cengage Learning.* Wadsworth: Cengage Learning.

Birditt, K. S., Newton, N., & Hope, S. (2014). Implications of marital/partner relationship quality and perceived stress for blood pressure among older adults. *Journals of Gerontology - Series B Psychological Sciences and Social Sciences*, *69*(2), 188-198. https://doi.org/10.1093/geronb/gbs123

Birditt, K. S., Newton, N. J., Cranford, J. A., & Ryan, L. H. (2016). Stress and negative relationship quality among older couples: Implications for blood pressure. *Journals of Gerontology - Series B Psychological Sciences and Social Sciences*, *71*(5), 775-785. https://doi.org/10.1093/geronb/gbv023

Birren, J. E., Warner, K. S., Abeles, R. P., Gatz, M., & Salthouse, T. A. (Eds.). (2006). *Handbook of the Psychology of Aging*. https://doi.org/10.1016/B978-0-12-101264-9.X5000-9

Cress, M. E., Buchner, D. M., Prohaska, T., Rimmer, J., Brown, M., Macera, C., DePietro, L., & Chodzko-Zajko, W. (2004). Physical activity programs and behavior counseling in older adult populations. *Medicine and Science in Sports and Exercise*, *36*(11), 1997-2003. https://doi.org/10.1249/01.MSS.0000145451.08166.97

d'Arbeloff, T. (2020). Cardiovascular fitness and structural brain integrity: an update on current evidence. *GeroScience*, 1-22. https://doi.org/10.1007/s11357-020-00244-7

Dale, H., Brassington, L., & King, K. (2014). The impact of healthy lifestyle interventions on mental health and wellbeing: A systematic review. *Mental Health Review Journal*, *19*(1), 1-25. https://doi.org/10.1108/mhrj-05-2013-0016

de Melker Worms, J. L. A., Stins, J. F., van Wegen, E. E. H., Verschueren, S. M. P., Beek, P. J., & Loram, I. D. (2017). Effects of attentional focus on walking stability in elderly. *Gait and Posture, 55*, 94-99. https://doi.org/10.1016/j.gaitpost.2017.03.031

Eckstrom, E., Neukam, S., Kalin, L., & Wright, J. (2020). Physical activity and healthy aging. *Clinics in Geriatric Medicine, 36*(4), 671-683. https://doi.org/10.1016/j.cger.2020.06.009

Elsegood, K. J., & Wongpakaran, N. (2012). The Effects of Guided Imagery on Affect, Cognition, and Pain in Older Adults in Residential Care. *Research in Gerontological Nursing*, *5*(2), 114-122.

Evans, W. J., & Grimby, G. (1995). Muscle Performance and Structure in the Elderly as Studied Cross-sectionally and Longitudinally. *The Journals of Gerontology Series A: Biological Sciences and Medical Sciences*, *50*, 17-22. https://doi.org/10.1093/gerona/50a.special_issue.17

Fisher, J., Steele, J., McKinnon, P., & McKinnon, S. (2014). Strength Gains as a Result of Brief, Infrequent Resistance Exercise in Older Adults. *Journal of Sports Medicine*, 1-7. https://doi.org/10.1155/2014/731890

Gao, X., Wang, L., Shen, F., Ma, Y., Fan, Y., & Niu, H. (2019). Dynamic walking stability of elderly people with various BMIs. *Gait and Posture*, 68, 168-173. https://doi.org/10.1016/j.gaitpost.2018.11.027

Gow, A. J., Corley, J., Starr, J. M., & Deary, I. J. (2013). Which social network or support factors are associated with cognitive abilities in old age? *Gerontology*, 59(5), 454-463. https://doi.org/10.1159/000351265

Granic, A., Hurst, C., Dismore, L., Davies, K., Stevenson, E., Sayer, A. A., & Aspray, T. (2019). Milk and resistance exercise intervention to improve muscle function in community-dwelling older adults at risk of sarcopenia (MIlkMAN): Protocol for a pilot study. *BMJ Open*, *9*(10), e031048.

https://doi.org/10.1136/bmjopen-2019-031048

Hassanijirdehi, M., Khak, M., Afshari-Mirak, S., Holakouie-Naieni, K., Saadat, S., Taheri, T., & Rahimi-Movaghar, V. (2015). Evaluation of pain and its effect on quality of life and functioning in men with spinal cord injury. *Korean Journal of Pain*, *28*(2), 129. https://doi.org/10.3344/kjp.2015.28.2.129

Holt-Lunstad, J., Smith, T. B., & Layton, J. B. (2010). Social relationships and mortality risk: A meta-analytic review. *PLoS Medicine*, *7*(7), e1000316. https://doi.org/10.1371/journal.pmed.1000316

Hwang, E. J., & Sim, I. O. (2020). Effect of a comprehensive health care program on blood pressure, blood glucose, body composition, and depression in older adults living alone: A quasi-experimental pretest–posttest study. *International Journal of Environmental Research and Public Health*, *17*(1), 220. https://doi.org/10.3390/ijerph17010220

Ito, T., Kawakami, R., Tanisawa, K., Miyawaki, R., Ishii, K., Torii, S., Suzuki, K., Sakamoto, S., Muraoka, I., Oka, K., & Higuchi, M. (2019). Dietary patterns and abdominal obesity in middle-aged and elderly Japanese adults: Waseda Alumni's Sports, Exercise, Daily Activity, Sedentariness and Health Study (WASEDA'S Health Study). *Nutrition, 58,* 149-155. https://doi.org/10.1016/j.nut.2018.05.029

Jehu, D., Paquet, N., & Lajoie, Y. (2017). Balance and mobility training with or without concurrent cognitive training does not improve posture, but improves reaction time in healthy older adults. *Gait and Posture*, *52*, 227-232. https://doi.org/10.1016/j.gaitpost.2016.12.006

Kaufman, P., & Wolff, E. A. (2010). Playing and protesting: Sport as a vehicle for social change. *Journal of Sport and Social Issues*, 34(2), 154-175. https://doi.org/10.1177/0193723509360218

Kenney, W. L., Wilmore, J. H., & Costil, D. L. (2015). *Physiology of Sport and Exercise. Sixth Edition.* Human Kinetics.

Kiik, S. M., Sahar, J., & Permatasari, H. (2018). Peningkatan Kualitas Hidup Lanjut Usia (Lansia) Di Kota Depok Dengan Latihan Keseimbangan. *Jurnal Keperawatan Indonesia*, *21*(2), 109–116. https://doi.org/10.7454/jki.v21i2.584

Klassen, A., Wickert, N., Tsangaris, E., Klaassen, R., & Anthony, S. (2017). Health-related quality of life. In *Cancer in Adolescents and Young Adults* (pp. 735-747). Springer, Cham. https://doi.org/10.1007/978-3-319-33679-4_30

Lin, L., Lo, M. S. W., Yang, N.-H., & Li, G.-J. (2019). Different Exercise Training On Reaction Time In Older Adults With Mild Cognitive Impairment. *Medicine & Science in Sports & Exercise*, *51*(6), 211. https://doi.org/10.1249/01.mss.0000561139.91510.3f

McArdle, W. D., Katch, F. I., & Katch, V. L. (2018). *Sports and Exercise Nutrition*. Lippincott: Williams & Wilkins.https://doi.org/10.1123/att.7.1.26

Mead, E., Brown, T., Rees, K., Azevedo, L. B., Whittaker, V., Jones, D., Olajide, J., Mainardi, G. M., Corpeleijn, E., O'Malley, C., Beardsmore, E., Al-Khudairy, L., Baur, L., Metzendorf, M. I., Demaio, A., & Ells, L. J. (2017). Diet, physical activity and behavioural interventions for the treatment of overweight or obese children from the age of 6 to 11 years. *Cochrane Database of Systematic Reviews*, 6. https://doi.org/10.1002/14651858.CD012651

Messier, S. P., Thompson, C. D., & Ettinger, W. H. (1997). Effects of long-term aerobic or weight training regimens on gait in an older, osteoarthritic population. *Journal of Applied Biomechanics, 13*(2), 205-225. https://doi.org/10.1123/jab.13.2.205

Miller, R. M., Bemben, D. A., & Bemben, M. G. (2021). Skeletal muscle adaptations following 80 weeks of resistance exercise in older adults. *Journal of Geriatric Physical Therapy*. https://doi.org/10.1519/JPT.0000000000000302

Mohammadi, S., Jalaludin, M. Y., Su, T. T., Dahlui, M., Mohamed, M. N. A., & Majid, H. A. (2019). Determinants of diet and physical activity in Malaysian adolescents: A systematic review. *International Journal of Environmental Research and Public Health*, *16*(4), 603. https://doi.org/10.3390/ijerph16040603

Moisescu, P. C. (2014). The Social Integration of Elders Through Free-time Activities. *Procedia - Social and Behavioral Sciences*, *116*, 4159-4163. https://doi.org/10.1016/j.sbspro.2014.01.909

Odden, M. C., Beilby, P. R., & Peralta, C. A. (2015). Blood Pressure in Older Adults: the Importance of Frailty. In *Current Hypertension Reports*, *17*(7), 1-8. https://doi.org/10.1007/s11906-015-0564-y

Porcari, J. P., Bryant, C. X., & Comana, F. (2015). *Exercise Physiology (Foundations of Exercise Science) 1st Edition*. FA Davis.

Ribeiro, A. S., Nunes, J. P., & Schoenfeld, B. J. (2020). Selection of Resistance Exercises for Older Individuals: The Forgotten Variable. *Sports Medicine*, *50*(6), 1051-1057. https://doi.org/10.1007/s40279-020-01260-5

Rudd, J. R., Pesce, C., Strafford, B. W., & Davids, K. (2020). Physical Literacy - A Journey of Individual Enrichment: An Ecological Dynamics Rationale for Enhancing Performance and Physical Activity in All. *Frontiers in Psychology*, *11*, 1904. https://doi.org/10.3389/fpsyg.2020.01904

Sawada, S. S., Tanimoto, M., Gando, Y., Murakami, H., Kawakami, R., Tsuda, H., Saito, H., Blair, S. N., & Miyachi, M. (2017). Effects of Combined Aerobic and Resistance Training. *Medicine & Science in Sports & Exercise*, *49*(5S), 34.https://doi.org/10.1249/01.mss.0000516908.86409.6c

Seco, J., Abecia, L. C., Echevarría, E., Barbero, I., Torres-Unda, J., Rodriguez, V., & Calvo, J. I. (2013). A long-term physical activity training program increases strength and flexibility, and improves balance in older adults. *Rehabilitation Nursing*, *38*(1), 37-47. https://doi.org/10.1002/rnj.64

Song, Y., Ren, F., Sun, D., Wang, M., Baker, J. S., István, B., & Gu, Y. (2020). Benefits of exercise on influenza or pneumonia in older adults: A systematic review. *International Journal of Environmental Research and Public Health*, *17*(8), 26-55. https://doi.org/10.3390/ijerph17082655

Szarota, Z., & Mackowicz, J. (2015). Social Policy and Models of Services for the Elderly International Perspective. *Polish Social Gerontology Journal*, *10*(2), 7-11.

WHO. (2016). *WHO Proposed working definition of an older person in Africa for the MDS Project.* World Health Organization.

Woodcock, J., Franco, O. H., Orsini, N., & Roberts, I. (2011). Non-vigorous physical activity and all-cause mortality: Systematic review and meta-analysis of cohort studies. *International Journal of Epidemiology*, *40*(1), 121-138. https://doi.org/10.1093/ije/dyq104

World Health Organization. (2020). *WHO Guidelines on physical activity, sedentary behaviour.* World Health Organization.

Yamada, T., & Demura, S. ichi. (2009). Relationships between ground reaction force parameters during a sit-to-stand movement and physical activity and falling risk of the elderly and a comparison of the movement characteristics between the young and the elderly. *Archives of Gerontology and Geriatrics*, *48*(1), 73-77. https://doi.org/10.1016/j.archger.2007.10.006

Yeh, W. L., Tsai, Y. F., Hsu, K. Y., Chen, D. W., Wang, J. S., & Chen, C. Y. (2020). Weight control in older adults with knee osteoarthritis: A qualitative study. *BMC Musculoskeletal Disorders*, *21*(1), 1-8. https://doi.org/10.1186/s12891-020-03480-2

Author Information

Cerika Rismayanthi
https://orcid.org/0000-0002-6588-1983
Sport Science Department, Faculty of Sports
Universitas Sebelas Maret
Surakarta
Indonesia
Contact e-mail: *cerikafik@gmail.com*

Sugiyanto
https://orcid.org/0000-0002-9991-5264
Sport Science Department, Faculty of Sports
Universitas Sebelas Maret
Surakarta
Indonesia

Agus Kristiyanto
https://orcid.org/0000-0001-7961-4643
Sport Science Department, Faculty of Sports
Universitas Sebelas Maret
Surakarta
Indonesia

Muchsin Doewes
https://orcid.org/0000-0001-5820-4119
Sport Science Department, Faculty of Sports
Universitas Sebelas Maret
Surakarta
Indonesia