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THERABAND EXERCISE PROGRAM: EFFECTIVE TO IMPROVE THE MUSCLE FITNESS OF THE ELDERLY

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Abstract: *Physical activity in the elderly is still primarily focused on cardiorespiratory exercise, with less emphasis placed on muscle fitness. Thus, exercises to promote muscular fitness are required. As a result, in the Covid-19 era, a fun fitness concept was developed to improve muscle fitness. The development process, however, must include validation and effectiveness testing. The research aims were to (1) examine the content's validity and (2) examine the effectiveness of the fun fitness training model. The development of a quantitative and qualitative approach was the research method used. Seven experts took part in the study, including five licenced fitness instructors and two sports academics. The effectiveness test included 30 elderly men and women aged 60 years and weighing 60-80 kg. A 1-4 Likert scale questionnaire, hand grip dynamometer, and leg dynamometer were used as research instruments. SPSS and Excel software was used to help with the Aiken formula data analysis technique and the paired samples t-test. The research was divided into four stages: (1) Developing models through the qualitative analysis of books and e-books; (2) evaluating the model quantitatively using the Delphi method; (3) Examining the findings of the evaluation of seven specialists; and (4) Conducting tests to assess the results. The 12 models were deemed realistic based on the seven experts' collective qualitative findings. According to quantitative findings, the value coefficients for the material's suitability, depth, and practicality range from V 0.76 to V 0.80. A significance value of 0.000<0.05 indicates that the findings of testing the effectiveness of the fun fitness model can significantly improve the strength of the arm and leg muscles. In conclusion, the fun fitness training model shows high content validity and has the potential to improve elderly muscle fitness.*

Keywords: *Exercise models, fun fitness, elderly, muscle fitness.*

INTRODUCTION

Nowadays, exercise has become a need for maintaining immunity. When the immune system is maintained, the body can fight illnesses and stays fit all the time. The Covid-19 virus is not extinct in the modern world. The elderly are particularly vulnerable to Covid-19 exposure. According to Ward et al., (2020) elderly are the ones who are most vulnerable to significant adverse complications from the Covid-19 virus. Grolli et al., (2021) research indicates that the elderly are more susceptible to the Covid-19 virus's adverse effects.

Statistics from the Ministry of Health (Kemenkes,2021) show that as of April 1, 2021, numerous people have been exposed to Covid, with data on 40,349,051 persons who have been vaccinated. The vaccines were allocated to three groups: 1,468,764 for health human resources (HR), 17,327,169 for public officers and 21,553,118 for the elderly. As a result, the elderly are prioritised and given vaccines so that the body's immunity improves and strengthens.

The new order is a challenge and unstable in the new normal period, thus the general population must be prepared to face this transition (Rahmatullah, 2021). The issue at arm is how to keep individuals healthy after receiving immunisations, especially the elderly. Steady body immunity is, of course, tied to fitness; to obtain it, one must engage in sports (Gumantan et al., 2020). Flexibility, body composition, aerobic capacity, and muscle fitness are all required for someone to be called fit (Lokhande et al., 2015). It is critical to remember that the elderly are towards the end of their life cycle, thus efforts to keep healthy are still being made by exercising according to their portion.

The old population in Indonesia has increased from the previous number of 24 million, and it is predicted to expand by 30-40 million people by 2020 (Arini et al., 2020). Humans will undergo social, psychological, and physiological changes as they age (Santoso, 2019). These changes undoubtedly have an impact on health. Earlier research found a strong link between low muscle fitness and disorders such as dementia, Alzheimer's, and Parkinson's (Boyle et al., 2009). According to Tramontana & Prüller-Strasser, (2018), inadequate muscle fitness is a risk factor for chronic disease and premature death.

According to observations that elderly people exercise in city parks, open fields, and neighbouring sports arenas, showing that the majority of the elderly participate in aerobic sports such as gymnastics, walking, jogging, and cycling (Zheng et al., 2022) . During observations in the sports building, it was discovered that the elderly participated in badminton and tennis activities. Furthermore, the authors conducted interviews with numerous fitness instructors and discovered that the exercise programme included a combination of aerobic exercise and weight training, but for the elderly, aerobic activity was prioritised (Yu et al., 2023).

According to this description, the majority of sports practised by the elderly are still aerobic. Muscle fitness workouts, on the other hand, are required in old age. According to studies, completing muscle fitness activities can lead to a considerable reduction in mortality in old age (Katzmarzyk & Craig, 2002). As a result, a pleasant fitness training model will be designed in the Covid-19 era to promote muscle fitness in the elderly following the dose of exercise, including the suitable model, intensity, and volume of exercise.

To be tested during the development research stage, the constructed model must, of course, go through a validation process. Validation is a critical step in the development research process (Akhiruyanto et al., 2022). In content validity, the initial stage validation is used (Nasrulloh et al., 2022). Content validity is used to assess how well the conceptual design has been produced in comparison to expert judgement (Septian et al., 2022; Yudhistira, Siswantoyo, et al., 2021; Yudhistira, Suherman, et al., 2021; Yudhistira & Tomoliyus, 2020; Yulianto & Yudhistira, 2021). Therefore, the objectives of this research were to (1) examine the content validity of the fun fitness training model and (2) test its effectiveness in improving muscle fitness in the elderly.

MATERIAL & METHODS

Participants

This study is development research, namely developing or validating an existing product to provide answers and solutions to issues encountered (Yulianto & Yudhistira, 2021). This study employed both qualitative and quantitative methods (Noroozi et al., 2020). This study included seven experts: five fitness instructors with national licences and two academics with Doctor of Sports degrees. In addition, 30 elderly men and women between the ages of ±60 and ±60-80 kilos were used in the model testing phase. All samples used in this research stage have had their health checked and are willing to be research samples.

Procedure/Test protocol/Skill test trial/Measure/Instruments

This research has four stages, namely qualitative analysis in the form of eBook documents, books, journal articles, and interviews to construct models and rationalise the difficulties. The model is then poured into the programme; the second stage is quantitative, particularly with the Delphi technique (Wilpers et al., 2021), an assessment of the produced model using a questionnaire; and the authors met directly with seven material experts to evaluate the model and programme. The final stage applied the Aiken formula to the expert assessment results [20]. The fourth stage involved testing effectiveness by performing experiments to evaluate if the model produced might improve muscle fitness, such as arm and leg muscle strength. The effectiveness test was carried out by first administering an initial test, then administering treatment for 8-12 meetings with a training frequency of 1-2 times per week followed by administering a final test. A 1-4 Likert scale questionnaire, hand grip dynamometer muscle strength instruments, and arm leg dynamometer muscle strength instruments were used in this study.

Data collection and analysis / Statistical analysis

SPSS version 23 and Excel applications were used to aid with data analysis procedures. The data analysis technique used in this study was parametric testing, which included prerequisite tests such as homogeneity and normality tests, followed by a paired samples t-test to compare pre-test and post-test outcomes. In addition, the Aiken formula was also used to do content validity analysis. The formula proposed by Aiken (lewis. R. Aiken, 1985) is as follows:

$V = \sum s / [n(c-1)]$
$S = r - lo$
Lo = the lowest validity rating score (e.g. 1)
C = the highest validity rating score (e.g. 5)
R = the number given by the appraiser

RESULTS

Content Validity

Qualitative Analysis Results

Based on document analysis which includes relevant eBooks, books and journal articles, an fun fitness training model for the elderly has been found along with a program that has been compiled and presented as follows:

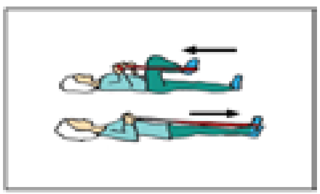

Figure 1. *Leg Press using theraband*

Procedures:

a. Position the feet shoulder-width apart, one knee bent to a 90-degree angle
b. Then the theraband is attached to the bent leg
c. The theraband is held in both hands
d. Both legs push off the terraband until the legs are straight
e. Loosen slowly until the position of the feet forms a 90-degree elbow angle
f. Push back up using the heels to return to the starting position

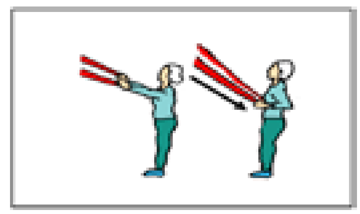

Figure 2. *Pull Down using theraband*

Procedures:

a. In a standing position, hold the theraband with both hands, slightly shoulder width apart
b. Pull the theraband straight down from the front of the head to the front of the chest

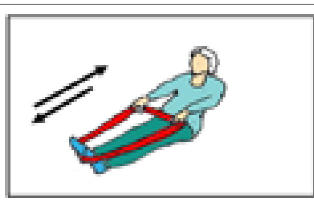

Figure 3. *Krunch using theraband*

Procedures:

a. Sit on the floor and wrap the theraband around your leg, holding it with both hands
b. Roll your spine down onto your back slowly, returning to the starting position slowly and keeping your arms as straight as possible

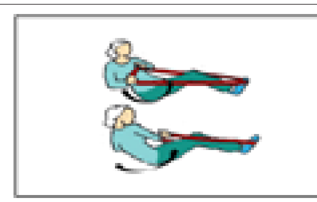

Figure 4. *Russian Twist using theraband*

Procedures:

a. Sit on the mat with the thighs on the floor, with your knees slightly bent.
b. Tighten the abs and hold them so that the buttocks are pressed against the mat.
c. Lean back so that it forms a 45-degree angle. Pull the theraband up to the top of the stomach.
d. Slowly rotate the body to the left side then alternately to the right side

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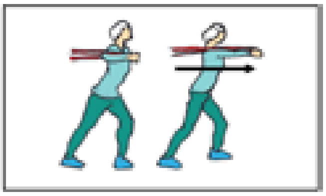

Figure 5. *Chest press using theraband*

Procedures:

a. Standing position, both feet resting on the floor parallel to the shoulders, both hands holding the terraband at shoulder height in front of the chest with elbows bent.
b. Inhale, then pull the theraband straight a little wider than the middle of the chest, moving forward slowly and under control
c. Return to the starting position by touching the terraband to your chest and exhaling.

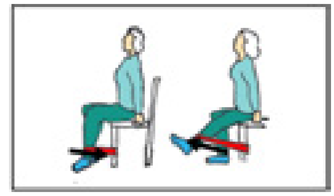

Figure 6. *Leg extension using theraband*

Procedures:

a. Sit on a chair with the feet pointing forward and both hands holding the right and left side of the chair, legs forming a 90-degree angle
b. Pull the theraband until the leg is straight and the rest of the body remains still. The pelvis remains still. During the contraction, hold for a few seconds.
c. Lower slowly until it returns to its original position.

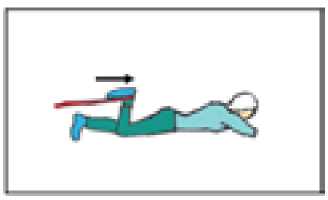

Figure 7. *Lying curl using theraband*

Procedures:

a. The initial position begins by turning the body upside down and is followed by hooking the theraband on the heel just behind the ankle.
b. Take a breath, then lift the leg or bend your leg by pulling the terraband up to the maximum towards the buttocks.

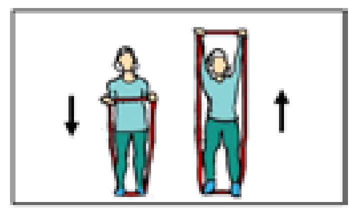

Figure 8*. Shoulder press using theraband*

Procedures:

a. While standing, hold the theraband with the elbows bent in front of the chest, palms facing forward shoulder-width apart, and the theraband hooked on the feet.
b. Push the theraband straight up using both hands then lower it back down to the starting position in front of the chest.

Figure 9. *Bicep curls using theraband*

Procedures:

a. Sit holding the bandage shoulder-width apart, with the elbows bent at a 90-degree angle.
b. Pull the theraband with both hands until it touches the chest. Then return to the starting position.

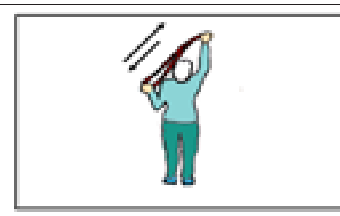

Figure 10. *Triceps ropes using theraband*

Procedures:

a. While standing, hold the theraband with the elbows bent in front of the chest, palms facing forward shoulder-width apart and hook the theraband on the feet.
b. Pushing the theraband straight up using both hands, lower it back down to the starting position in front of the chest.

Figure 11. *Rowing using theraband*

Procedures:

a. The initial position is sitting holding on to the theraband which is also attached to the leg.
b. Rowing by pulling the theraband so that the scapulae are close together or pulling the theraband towards the chest. Open both palms when it reaches the chest.

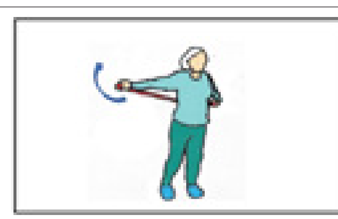

Figure 12. *Butterfly using theraband*

Procedures:

a. The starting position is standing straight with both hands holding the theraband straight in front of the chest.
b. Pull the theraband straight to the side at shoulder height. Hold for a few seconds, then return to the starting position

Table 1. *Fun fitness training program to improve muscle fitness in the elderly*

Week	Meeting	Exercise Items	Exercise Dosage
1-2	1-4	Post 1: Leg press Post 2: Pull Down Post 3: Abdominal Post 4: Leg extension Post 5: Chest press Post 6: Russian twist Post 7: Bicep curl Post 8: Shoulder press Post 9: Laying leg curl Post 10: Triceps Post 11: Rowing Post 12: Butterfly	• **Warming up**: The elderly are given instructions on the exercise programme that is provided. The elderly are instructed to stretch for 7 minutes using static and dynamic stretching variations. • **Core exercises** a. Method: Circuit b. Frequency: 1 time c. Sets: 1 round d. Repetitions: 4-6 times e. Rest between exercise items: 20-30 seconds/according to conditions f. Intensity: Low- Moderate • **Cooling down**: The elderly are instructed to undertake static stretching for 7 minutes with suitable stretching variations, followed by motivation and closing.
3-4	5-8	Post 1: Leg press Post 2: Pull Down Post 3: Abdominal Post 4: Leg extension Post 5: Chest press Post 6: Russian twist Post 7: Biceps curl Post 8: Shoulder press Post 9: Laying leg curl Post 10: Triceps Post 11: Rowing Post 12: Butterfly	• **Warming up:** The elderly are given instructions on the workout programme that is offered to them. The elderly are instructed to stretch for 10 minutes, with sufficient stretching variations. • **Core exercises** a. Method: Circuit b. Frequency: 2 times c. Sets: 1-2 rounds d. Reps: 6 times e. Rest between exercise items: 2-30 seconds / according to conditions f. Rest between sets: 5-6 minutes g. Intensity: Low - Moderate • **Cooling down**: The elderly are instructed to undertake static stretching for 7 minutes with suitable stretching variations, followed by motivation and closing.
5-6	9-12	Post 1: Leg press Post 2: Pull Down Post 3: Abdominal Post 4: Leg extension Post 5: Chest press Post 6: Russian twist Post 7: Biceps curl Post 8: Shoulder press Post 9: Laying leg curl Post 10: Triceps Post 11: Rowing Post 12: Butterfly	• **Warming up:** The elderly are given instructions on the exercise programme that is provided. The elderly are instructed to stretch for 7 minutes using static and dynamic stretching variations. • **Core exercises** a. Method: Circuit b. Frequency: 2 times c. Sets: 2 rounds d. Reps: 6 times e. Rest between exercise items: 20-30 seconds / according to conditions f. Rest between sets: 5-6 minutes g. Intensity: Low-Moderate • **Cooling down:** The elderly are instructed to undertake static stretching for 7 minutes with adequate stretching variations, followed by motivation and closing.

Quantitative Analysis Results

The quantitative analysis results were achieved by the assessment of 7 experts, and all experts completed the authors-prepared questionnaire. The Aiken formula was used to examine the findings of these data. The calculation data is shown below:

Table 2. *The findings of the Aiken formula-based content validity*

Aspect		Assessor								
		1	2	3	4	5	6	7	S	V
1	**Score**	4	3	3	3	4	3	4		
	S	3	2	2	2	3	2	3	17	0.80
2	Score	3	3	3	3	4	3	3		
	S	2	2	2	2	3	2	2	16	0.77
3	Score	3	3	3	3	4	3	3		
	S	2	2	2	2	3	2	2	17	0.80
4	Score	3	4	3	3	4	3	3		
	S	2	3	2	2	3	2	2	16	0.77
5	Score	4	4	3	3	4	3	4		
	S	3	3	2	2	3	2	3	18	0.86
6	Score	3	3	3	3	4	3	4		
	S	2	2	2	2	3	2	3	16	0.77
7	Score	3	4	3	3	4	3	3		
	S	2	3	2	2	3	2	2	17	0.80
8	Score	3	3	3	3	4	3	4		
	S	2	2	2	2	3	2	3	16	0.77
9	Score	4	4	3	3	3	3	4		
	S	3	3	2	2	2	2	3	17	0.80

Data on aspects (1) of compatibility with the objectives to be attained yielded a coefficient value of V 0.80 based on the results of the Aiken formula analysis. Aspect (2), the material's suitability for the needs of the elderly, receives a coefficient of V 0.77. Aspect (3), the material's completeness, receives a coefficient value of V 0.80. (4) The material's suitability concerning elderly fitness receives a coefficient of V 0.77. The depth of the material with the needs of the elderly receives a coefficient of V 0.86 in Aspect (5). Aspect (6) muscle strengthening activities are safe for the elderly, resulting in a V 0.77 coefficient value. Aspect (7), the level of ease in implementing material for the age, receives a coefficient value of V 0.80. The coefficient value for aspect (8) activities planned to pleasure the elderly is V 0.77. Aspect (9) exercises that are simple to understand for the elderly have a coefficient value of V 0.80. According to Aiken's analysis, the content validity value coefficients varied from 0.76 to 0.80, indicating that the developed model and programme have good content validity based on 7 material experts

Homogeneity Test

In this section the authors presents the results of the prerequisite test, namely the homogeneity test, the results are presented as follows:

Table 3. *The homogeneity test findings for the two variables' pre test – post test values*

Variable	Pre test - Post test	Significance	Description
Hand squeeze strength	Pre-test	0.621	Homogenous
	Post-test		
Leg muscle strength	Pre-test	0.731	Homogenous
	Post-test		

Based on the data, the significance value of the variable hand squeeze strength is 0.621> 0.05, and the significance value of the variable leg muscle strength is 0.731> 0.05. If the significance value is more than 0.05, the two variables are considered to be homogenous.

Normality test

In this section, the authors present the results of the prerequisite test, namely the normality test. The results are presented as follows:

Table 4. *The normality test findings for the pre test – post test values of two variables*

Variable	Pre test - post test	Significance	Description
Hand squeeze strength	Pre-test	0.313	Normal
	Post-test	0.662	Normal
Leg muscle strength	Pre-test	0.585	Normal
	Post-test	0.531	Normal

Based on the data acquired, the significant value of the variable hand squeeze strength was found to be 0.313> 0.05 for the pre-test and 0.662> 0.05 for the post-test. It was also discovered that the pre-test was 0.585> 0.05, and the post-test was 0.531> 0.05 in the variable leg muscle strength. The total significance value is more than 0.05. As a result, the data is considered to be normally distributed.

Paired Samples t-test

In this section, the authors present the results of hypothesis testing, namely the paired samples t-test. The findings are presented as follows:

Table 5. *The findings of the paired samples t-test on both variables*

Variable	Pre test – post test	Mean	Significance	Description
Hand squeeze strength	Pre-test	16.53	0.000	Significant
	Post-test	19.12		
Leg muscle strength	Pre-test	11.14	0.000	Significant
	Post-test	11.98		

Based on the data that has been obtained, the significance value of the hand squeeze strength variable is 0.000<0.05 and the significance value of the leg muscle strength variable is 0.000<0.05. Thus, it can be described that the fun fitness model can significantly increase the hand squeeze strength and the strength of the leg muscles. This result is proven by the significance value of the entire variable is 0.000 <0.05.

DICUSSION

The content validation results revealed that the nine questions covered aspects of suitability, completeness, safety, and practicality. The average rating ranged from V 0.76 to 0.80, indicating that the fun fitness training model that was compiled was good and feasible for field testing. Experts agree that content validity coefficients between 0.70 and 1.00, or close to one, indicate good content validity (Yulianto & Yudhistira, 2021)

The data effectiveness test findings revealed that the significant value for the hand squeeze strength variable was 0.000<0.05, followed by the significance value for the leg muscle strength variable being 0.000<0.05. According to studies, a significance value of <0.05 is considered significant (Rizka et al., 2022). As a result, the fun fitness training model packed in an exercise programme can improve elderly hand squeeze strength and leg muscular strength.

Fun fitness is a weight training concept specifically created for the elderly, allowing them to practise activities that are both pleasant and acceptable. Health promotion is associated with fun fitness (Polubinsky & Plos, 2007).

This exercise has the same premise as weight training in that it leverages the surrounding environment with loading techniques based on weight training concepts.

The authors established the notion of fun fitness after discovering that the workouts undertaken by the elderly tended to affect cardio respiratory fitness while ignoring muscle fitness. Weight training in the elderly is crucial for avoiding the risk of bone loss so that the bones get denser and of course can enhance body posture. The circuit training approach is used to construct an fun fitness training model to improve cardio respiratory capacity and muscle strength.

Weight training has traditionally been separated from aerobic exercise, which is typically done two to three days a week (Klika, B., 2013). Also, the recommended weight training is to perform 8 to 12 repetitions at a low to moderate intensity, depending on the participants' needs and level of training (Klika, B., 2013). Circuit training is one approach to combining aerobic exercise and strength training. Circuit training activities planned according to dosage can improve the aerobic and anaerobic systems, as well as increase muscle strength and endurance (Buckley et al., 2015).

Weight training is beneficial for improving individual abilities such as muscle endurance, hypertrophy, and athletic performance. Research conducted by (Ferreira et al., 2012), Weight training is beneficial for improving individual abilities, such as muscular endurance. According to recent research, weight training regularly can enhance body composition, insulin sensitivity, blood glucose levels, and hypertension (Yaacob et al., 2016; Zheng et al., 2022). According to (Krzysztofik et al., 2019; Nguyen et al., 2016) weight training is a structured and planned activity that uses weights to help muscles develop better and stronger. Another viewpoint is that weight training is highly familiar because the exercises performed can be completed in a short period while changing body shape and sports performance (Baker et al., 2013)(Baechle, & Earle, 2014).

Weight training is associated with muscle-building, muscle development, and muscle-maintenance exercises. Strength is defined as the effort exerted by a set of muscles in performing a good contraction, pulling, pushing, or holding a load (Nasrulloh et al., 2020, 2022). The theraband tool is one of the muscle-training instruments. Theraband is a sports item that looks like elastic rubber and is used for strength training. It seeks to improve mobility, balance, joint pain, and muscle strength (Kwak et al., 2016; Lin & Sung, 2012)

Theraband comes in a variety of colour codes based on its thickness and resistance, including red, green, blue, silver, gold, and yellow (Anwer et al., 2021). Recent research has demonstrated that training with terraband media can improve muscle strength in the elderly (Pourtaghi et al., 2017). As a result, a strength training paradigm utilising broadband media as a load must be implemented, and the exercises must be presented in an appealing, varied, and safe manner for the elderly to perform. Furthermore, weight training must adhere to the rules of frequency, intensity, time, and type (Schoenfeld et al., 2021)(Sandler,2010). Furthermore, in the new normal era, it is critical to develop and manage exercise programmes, particularly for the elderly, so that the exercise performed is beneficial. Furthermore, in the new normal era, it is very important to develop and manage exercise programs, especially for the elderly, so that the exercise they do can provide benefits. Strengthening exercises are recommended as one of the main exercises to prevent loss of muscle mass due to aging and improve strength, endurance and muscle function. One of the recommended strengthening exercise models is the theraband exercise program. This program has been proven to be suitable for use in the elderly and has been proven to be very effective in increasing muscle strength and endurance in the elderly. The limitation of this research is that researchers have difficulty in controlling the physical health condition of the elderly, which can decline at any time.

CONCLUSIONS

The fun fitness training model bundled in the training programme has good content validity, according to the assessment of seven experts, as indicated by the validity coefficient ranging from 0.76 to 0.80. Then, based on the effectiveness test, the fun fitness training model can enhance muscle fitness, including squeezing hand strength and arm muscle strength, as demonstrated by a significance value of >0.05 for the entire variable. Fun fitness is a concept developed by the authors to provide awareness and as an acceptable training approach for the old, that not only cardiovascular capability but also muscle fitness, is required to support the health of the aged.

Conflicts of interest

All authors declare no conflict of interest

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