

## Enhancing Physical Fitness in Older Adults with FITT-VP

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**Abstract :** Exercise is a health behavior that plays a crucial role in enhancing physical fitness and preventing non-communicable diseases (NCDs) across all populations, particularly among older adults. In the current global context of an aging society, sedentary lifestyles and insufficient physical activity remain critical issues, negatively affecting quality of life and burdening national healthcare systems. The application of the FITT-VP principle provides a systematic framework to regulate frequency, intensity, duration, type, volume, pattern, and progressive overload in exercise programs. Extensive research has provided substantial evidence that adherence to the FITT-VP principle produces measurable gains in physical fitness while simultaneously reducing the likelihood of non-communicable diseases and fostering both psychological and social well-being. Comprehending and implementing exercise prescriptions guided by the FITT-VP framework is crucial for developing targeted programs for older adults, supporting the improvement of physical capacity while mitigating the risk of chronic non-communicable diseases.

**Keywords :-** Exercise based on the FITT-VP principle, physical fitness, older adults

### I. Introduction

The promotion of physical fitness is essential for work efficiency and daily functioning. Physical fitness is important for all age groups, particularly among older adults. According to the World Health Organization (2024), more than 1.8 billion adults and older individuals worldwide, representing one third of the global adult and elderly population, engage in physical activity levels below the recommended standard. Women tend to exercise less than men (World Health Organization, 2022), accounting for as much as 60 percent of adults aged 45 to 69 in regions such as the Americas, the eastern Mediterranean, and parts of Asia, where over 55 percent of the population performs below the WHO recommended physical activity levels. Low levels of physical activity or increased sedentary behavior significantly affect individual health. The World Health Organization (2020) reports that the leading health conditions associated with physical inactivity among older adults include obesity, mental health problems, cancer, diabetes, and cardiovascular diseases. This finding is consistent with research conducted between 2022 and 2025, which identified the four most prevalent noncommunicable diseases among older adults as hypertension, hyperlipidemia, and diabetes (Meenakshi Chobe et al., 2022; Rashmi & Mohanty, 2023; World Health Organization, 2024; Boonthong et al., 2024; Ramanujam et al., 2025). These diseases are often linked to risk factors such as high fat intake, excessive sugar or salt consumption, alcohol use, smoking, and most importantly, lack of physical exercise.

Strategic plans developed by the World Health Organization and national health promotion agencies in

Thailand emphasize the importance of enhancing physical fitness among older adults. As global populations transition into aging societies, promoting exercise has become a crucial strategy to counteract sedentary lifestyles associated with modern work habits and low energy expenditure. Such sedentary behavior increases the risk of life-threatening conditions, including cardiovascular disease, cancer, and type 2 diabetes (WHO, 2020). Research has shown that regular exercise among older adults can significantly reduce mortality rates related to cardiovascular disease (Ekelund et al., 2019). Engaging in consistent physical activity plays an effective role in reducing the risk of chronic noncommunicable diseases and contributes to sustainable health outcomes.

The FITT-VP principle (Frequency, Intensity, Time, Type, Volume, Pattern and Progression) represents a globally recognized framework for designing effective exercise programs that enhance physical fitness across different ages and populations. This principle allows for systematic planning of exercise prescriptions tailored to individual or group objectives. The FITT VP components include frequency, intensity, duration, type of exercise, total exercise volume, and progression. These variables can be applied to various exercise modalities such as aerobic exercise, which enhances cardiovascular and pulmonary efficiency by increasing heart rate and oxygen transport throughout the body, supporting sustained moderate intensity activity, or resistance exercise, which involves the use of body weight, bars, dumbbells, or machines to strengthen muscles and bones. The FITT VP framework can also be applied to recreational and leisure activities designed to promote physical fitness and overall well-being among older adults. The author recognizes the critical importance of promoting physical fitness, particularly among older adults, as Thailand is inevitably entering an aging society. According to national demographic surveys on the elderly population in Thailand (2024), the proportion of older adults has increased significantly from 6.8% to 20%, or from approximately 5 million to 20 million people between 1994 and 2024. Physical fitness serves as a fundamental foundation for daily living, enabling individuals to perform routine activities efficiently while maintaining independence and reducing the risk of non-communicable diseases. Sustained physical fitness contributes to long-term health and well-being in later life. In light of this importance, the promotion of physical fitness among the elderly can be systematically planned through the application of the FITT-VP principle, which provides a structured framework for designing exercise programs aimed at effectively enhancing the physical fitness and overall health of older adults.

## **II. Health Promotion Policy**

The Physical Activity Promotion Plan Development Committee (2018-2030) outlined comprehensive strategies for advancing public health through the promotion of physical activity across multiple dimensions. At the global level, three major international organizations have played key roles in this effort. First, the World Health Organization (WHO) established the Global Action Plan on Physical Activity and the Action Plan for the Prevention and Control of Noncommunicable Diseases (NCDs). Second, the Global Advocacy for Physical Activity (GAPA) initiative developed seven strategic investment areas aimed at promoting cost-effective physical activity interventions worldwide. Third, the International Society for Physical Activity and Health (ISPAH) has championed the Toronto Charter for Physical Activity, serving as a global framework for policy development and implementation in this field. Furthermore, strategic frameworks for promoting physical activity have been developed in more than fifteen countries across four global regions. These frameworks include both specific action plans dedicated to physical activity promotion and broader health promotion strategies that integrate physical activity as a key component. Although each country's approach reflects its unique social, cultural, and economic context, the policies demonstrate consistent alignment around three central themes. According to Sub-competency 1.1.2, "Identify priority population(s)" (NCHEC, 2026), established by the National Commission for Health Education Credentialing, health education specialists are responsible for systematically identifying populations that require exercise programs or physical activity. To develop evidence-based strategies that promote health improvement and to examine the multifactorial determinants that may influence the effectiveness and functional outcomes of exercise interventions among older adults. Older adults represent a priority population due to their increased vulnerability to declining physical health and related chronic conditions. The planning process begins with a comprehensive needs assessment to define the scope and magnitude of the issue and to justify the selection of this population group. The intervention can be guided by the FITT-VP principle to structure an evidence-

based exercise program. This approach aligns with area of responsibility I, which focuses on assessment of the target population.

The first emphasizes the promotion of physical activity across all age groups, recognizing the importance of encouraging active lifestyles from childhood through older adulthood. The second focuses on fostering physical activity within diverse settings and systems, such as schools, workplaces, communities, and healthcare environments, to ensure accessibility and inclusiveness for all population segments. The third highlights the advancement of physical activity promotion through systematic development, including capacity building, research, policy formulation, data management, financial investment, and continuous monitoring and evaluation. Together, these themes provide a comprehensive framework that supports the integration of physical activity into public health policy and practice at both national and global levels. In Thailand, the promotion of physical activity is guided by several national policy frameworks, including the Constitution of the Kingdom of Thailand (2017), the 20-Year National Strategy (2017–2036), the 12th National Economic and Social Development Plan, the 20-Year Public Health Strategic Plan, the Health Promotion Fund Act (2001), and the 7th National Sports Development Plan. These frameworks collectively emphasize the importance of integrating physical activity into national health and development agendas. According to the Department of Health of Thailand (2021), Thailand's initiatives focus on five key areas. These include promoting physical activity among children in schools, encouraging active lifestyles among working-age adults, expanding opportunities for all age groups through community and mass sports programs with particular attention to older adults, integrating physical activity into the public health system, and developing a unified national framework for implementation and evaluation. Together, these initiatives demonstrate a comprehensive and sustainable approach to enhancing public health through active living.

In Thailand, the proportion of the elderly population has been continuously increasing. Key agencies that play significant roles in supporting this demographic include the Ministry of Public Health, the Thai Health Promotion Foundation, and the Ministry of Interior. In particular, the Department of Local Administration holds a pivotal role in facilitating and providing equipment and venues for physical activities. This includes the development of exercise facilities and the organization of health-related activities such as walking, running, and cycling events. Such initiatives aim to enhance accessibility and suitability of physical activities for older adults (Department of Health of Thailand, 2021). In summary, health promotion policies have been established as a national agenda, receiving strong attention from both public and private sectors. These policies aim to encourage individuals to engage in regular physical activity as part of their daily lives, a critical factor in strengthening overall health, reducing the risk of non-communicable diseases, and improving long-term quality of life. The main strategic approaches of these policies include designing environments conducive to physical movement, developing engaging and appealing activities, strengthening family and community support systems, and establishing strategic goals and exercise methods that align with individual needs and appropriateness.

### **III. The Dissimilarity between Physical Activity and Exercise**

It is well recognized that physical activity refers to any bodily movement that results in energy expenditure above resting levels. Its primary purpose is to promote bodily movement throughout the day and reduce sedentary behavior. Physical activity refers to any bodily movement that increases energy expenditure above resting levels. It aims to promote daily movement and reduce sedentary behavior, encompassing activities in daily life, work, and recreation such as gardening, walking, cleaning, or playing sports. In contrast, exercise is a structured and repetitive form of physical activity performed systematically. It typically involves specific planning regarding duration, intensity, frequency, and clearly defined objectives. Examples include running, swimming, cycling, or practicing yoga. The goals of exercise may include improving muscular strength, enhancing cardiovascular endurance, or achieving mental relaxation and enjoyment. From this perspective, exercise can be considered a subset of physical activity. Exercise generally includes various forms, such as aerobic training, resistance training, flexibility exercises, and balance training. To be effective, it requires continuity, proper planning, and adherence to appropriate stages and procedures to achieve optimal outcomes

In conclusion, while exercise constitutes a part of overall physical activity, it differs in its structured and goal-oriented nature, specifically designed to enhance physical fitness and health. Exercise has been shown to effectively improve the physical performance of older adults, particularly in terms of flexibility, brisk walking ability, and neuromuscular coordination (Ramos-Álvarez et al., 2025).

#### IV. Physical Fitness

Physical fitness can be categorized into two main types including health-related physical fitness and skill-related physical fitness. Health-related physical fitness comprises cardiorespiratory endurance, muscular strength, muscular endurance, flexibility, and body composition. These components are essential for maintaining good health, enabling individuals to perform daily activities efficiently, and reducing the risk of various non-communicable diseases (Samahito, 2006; Ortega et al., 2007; Riebe et al., 2018). Cardiorespiratory endurance refers to the body's ability to sustain prolonged physical activity through the coordinated function of the heart, lungs, and blood vessels in delivering oxygen and nutrients to muscle cells, forming a foundation for overall physical fitness development. Muscular strength is the ability of muscles to exert force against external resistance, essential for maintaining body stability in both basic and complex movements. Muscular endurance refers to the ability of muscles to repeatedly contract at a moderate intensity over an extended period. Flexibility is defined as the capacity of joints and surrounding muscles to move through their full range of motion (Department of Thailand Physical Education, 2019), which can be developed through dynamic or static stretching. Body composition represents the proportions of different body components contributing to total body weight, reflecting the balance between fat mass and fat-free mass and serving as an indicator of nutritional status and overall health. Skill-related physical fitness includes speed, muscular power, agility, balance, reaction time, and coordination between the nervous and muscular systems. These components are vital for enhancing movement efficiency and performance, particularly with activities that require specific tasks to optimally perform such a sport skill (Siedentop & Van der Mars, 2012). An optimal level of physical fitness contributes to enhanced participation in physical activities and greater engagement in sports (Malina, 2001).

The key components of physical fitness essential for older adults include cardiorespiratory endurance, muscular strength and endurance, flexibility, balance, neuromuscular coordination, and body composition. These factors play a vital role in maintaining functional independence and overall quality of life in older age. Physical activity serves as an effective means to enhance these fitness components. Research has shown that higher levels of cardiovascular and respiratory endurance are strong predictors of increased longevity (Phan et al., 2022; Whelton et al., 2021) and are significantly associated with a reduced risk of mortality from cardiovascular diseases (Kokkinos et al., 2023).

#### V. Guidelines for Designing Exercise Programs to Enhance Physical Fitness

In Thailand, exercise programming is commonly based on the four components of the FITT principle. However, international frameworks provide more detailed guidance. The American College of Sports Medicine (ACSM) specifies the FITT-VP principle as a comprehensive guideline for promoting physical fitness. This framework is applicable not only to healthy adults but also to individuals with chronic conditions and older adults. Regular exercise performed according to the FITT-VP principle applied correctly and appropriately enhances all components of physical fitness, contributes to overall physical health, reduces the risk of chronic diseases, improves functional capacity, and supports long-term quality of life. The FITT-VP principle (ACSM, 2018; 2022; Kaya Utlu, 2023) is widely adopted for exercise program design. It consists of seven core components that guide planning across diverse populations, including older adults. The essential elements of the FITT-VP principle are outlined as follows Frequency refers to how often exercise is performed per week. For the general population, engaging in exercise for at least three days per week is typically recommended. Intensity denotes the level of exertion or degree of effort during exercise. Appropriate intensity depends on the targeted component of fitness. For instance, muscular strength can be developed by training at 80–95% of one-repetition maximum (1RM), cardiorespiratory endurance can be improved by exercising at 50–85% of maximal heart rate, and muscular endurance can be enhanced by working at 40–60% of 1RM, which corresponds to light to moderate intensity.

Time represents the duration of each exercise session performed continuously to sufficiently stimulate physiological adaptation. Suitable exercise duration varies by modality and intensity. For older adults, an ideal session typically lasts 20–60 minutes. Type describes the mode or category of physical activity, such as aerobic and anaerobic exercise, resistance training, flexibility training, balance and coordination exercises, and multimodal training. Volume refers to the total amount of exercise performed within a given timeframe. It incorporates frequency, intensity, and time, as well as appropriate rest intervals relative to the exercise modality. Pattern involves the structure of exercise sessions, including scheduling, repetition, interval configuration, and recovery periods. These differ across exercise types. For example, flexibility training emphasizes repetition and stretch duration; aerobic training focuses on continuous versus interval formats and phase duration; resistance training considers rest between sets and weekly training frequency. Progression is the gradual increase in exercise intensity, volume, or complexity to ensure continual physiological adaptation while minimizing the risk of overtraining or injury (ACSM, 2018; 2022). Exercise programs designed using the FITT-VP principle are widely applied to improve cardiorespiratory endurance, muscular strength, flexibility, and balance, which are fundamental components of physical fitness that contribute to maintaining functional abilities and supporting overall health and quality of life in older adults.

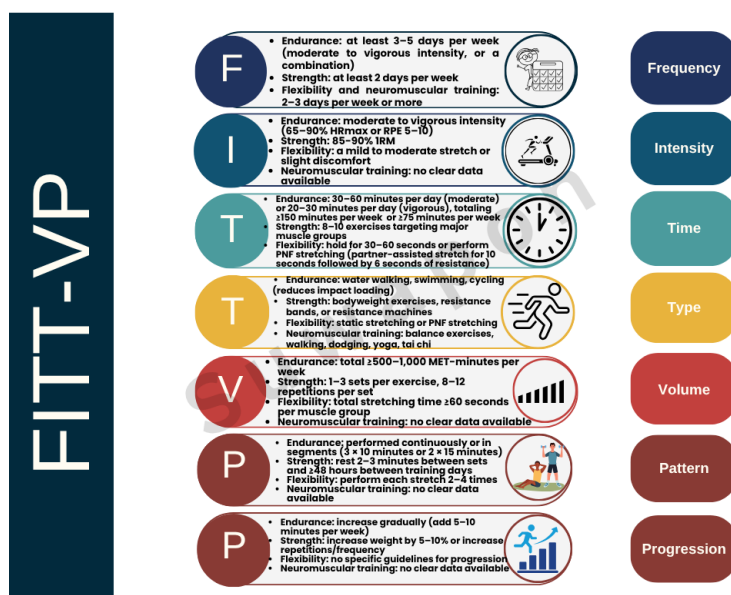


Figure 1. FITT-VP Principle for older adults

## VI. Exercise Program Design for Enhancing Physical Fitness in Older Adults

Cardiorespiratory endurance training for older adults can be performed daily, and current guidelines recommend that moderate-intensity exercise be undertaken on at least five days per week, while vigorous-intensity exercise be performed on at least three days per week. An alternative option is to combine moderate and vigorous-intensity exercise on  $\geq 3$ –5 days per week (ACSM, 2018; 2022). The appropriate intensity and volume of exercise should be tailored to each individual's fitness level. A structured exercise program that aligns with age-related physiological changes can effectively promote physical health, reduce susceptibility to illness, and enhance physical fitness among older adults. To improve overall physical fitness, older adults are advised to accumulate 150–300 minutes of moderate-intensity physical activity per week, which corresponds to 30–60 minutes per day on at least five days per week, or 60–100 minutes per day on a minimum of three days per week. For vigorous-intensity exercise, the recommended amount is 75–150 minutes per week, achieved by engaging in 25–50 minutes per day on at least three days per week, or 15–30 minutes per day on at least five days per week (WHO, 2020; 2021; 2022; ACSM, 2018; 2022).



Figure 2. Exercise recommendations based on duration  
Adapted from WHO, 2020; 2021; 2022 and ACSM, 2018; 2022

### **FITT-VP Guidelines for Promoting Physical Fitness in Older Adults According to the American College of Sports Medicine (ACSM, 2018; 2022)**

The American College of Sports Medicine (ACSM) provides evidence-based exercise recommendations for adults and older adults through the FITT-VP framework, which includes Frequency, Intensity, Time, Type, Volume, Pattern, and Progression. Each component is outlined in the following section.

#### **Frequency**

Aerobic exercise should be performed at least three days per week for vigorous-intensity training and at least five days per week for moderate-intensity training, or a combination of both intensities on 3-5 days per week. Resistance training should be performed at least two days per week, while flexibility exercises and neuromuscular training (e.g., balance and coordination activities) should be practiced two to three days per week or more.

#### **Intensity**

The intensity of aerobic exercise should range from moderate to vigorous, equivalent to 64-95% of maximal heart rate (HR<sub>max</sub>) or a Rating of Perceived Exertion (RPE) of 5-8 on the Borg scale. For resistance training, an intensity of 40-50% of one-repetition maximum (1RM) or an RPE of 2-4 is recommended. Flexibility training should involve stretching to the point of tension or mild discomfort at light to moderate levels. For neuromuscular training, no specific intensity guidelines have been established.

#### **Time**

Aerobic exercise should last 30-60 minutes per day for moderate-intensity activity or 20-30 minutes per day for vigorous-intensity activity, totaling at least 150 minutes per week of moderate exercise or 75 minutes per week of vigorous exercise. Each session should last at least 10 minutes. Resistance training should include 8-10 exercises focusing on major muscle groups. Flexibility training involves holding each stretch for 30-60 seconds, or using

proprioceptive neuromuscular facilitation (PNF), in which a partner assists with stretching for approximately 10 seconds followed by 6 seconds of resistance. Neuromuscular training should be performed for 20–30 minutes per session.

### **Type**

Aerobic activities should minimize impact on the joints, such as water walking, swimming, or cycling. Resistance training may involve bodyweight exercises, elastic bands, or machine-based resistance. Flexibility training may include both static stretching performed independently and assisted stretching. Neuromuscular training emphasizes balance, coordination, gait, agility, and mobility-enhancing activities such as yoga, tai chi, or chair rise exercises.

### **Volume**

The recommended volume of aerobic exercise is  $\geq 500$ –1,000 MET-minutes per week, equivalent to approximately 5,400–7,900 steps per day. Resistance training should include 1–3 sets of 8–12 repetitions per exercise. Flexibility training should accumulate at least 60 seconds of stretching per muscle group. Currently, there is insufficient evidence to specify the ideal volume for neuromuscular training.

### **Pattern**

Aerobic exercise may be performed continuously in a single 30-minute session or accumulated in multiple bouts such as  $3 \times 10$  minutes or  $2 \times 15$  minutes, provided the total weekly duration reaches 150 minutes. Resistance training should allow 2–3 minutes of rest between sets and at least 48 hours between training sessions for the same muscle group. Flexibility exercises should include 2–4 repetitions per stretch, preceded by a light-to-moderate aerobic warm-up to enhance muscle extensibility.

### **Progression**

For aerobic exercise, progression should be gradual, beginning with lower volumes and increasing duration by approximately 5–10 minutes per week to reduce injury risk. Resistance training progression may involve increasing weight by 5–10%, adding repetitions, or increasing training frequency. Currently, research has not provided clear progression guidelines for flexibility or neuromuscular training.

In addition to the recommendations provided by the American College of Sports Medicine (ACSM) regarding the application of the FITT-VP principle, the author reviewed related research and scholarly documents on the use of FITT-VP for promoting physical fitness in older adults. The findings indicate that the purpose of applying the FITT-VP components vary depending on the specific fitness outcomes targeted, particularly those related to the prevention and management of age-related health issues such as reduced muscular strength, loss of muscle mass, and physical frailty. Structured resistance training plays a critical role in mitigating physiological decline, provided that appropriate techniques are used, including proper exercise execution, program design, determination of training intensity and volume, selection of multi-joint movements, and planned progression (Fragala et al., 2019). Aerobic exercise also contributes to enhancing cardiorespiratory endurance and supporting circulatory function (Milani et al., 2024), which are essential for maintaining continuity in training and achieving desired fitness outcomes. Overall, achieving optimal physical fitness requires a systematic and consistent exercise planning process. In summary, the FITT-VP framework serves as a fundamental guideline for designing structured exercise programs that can be individually tailored, particularly for older adults, to enhance physical fitness, prevent physiological deterioration, and promote long-term quality of life.

### **Physical Activity for Enhancing Physical Fitness in Older Adults**

Walking and cycling are forms of physical activity accessible to people of all ages, including older adults, and can be incorporated into daily life (Global Status Report on Physical Activity, 2022). However, appropriate exercise for

older adults should avoid high-impact or weight-bearing activities, as many in this population experience degenerative joint conditions or other musculoskeletal issues. Exercise programs should therefore emphasize activities that promote muscular strength, flexibility, and cardiovascular function without imposing excessive pressure or impact on the joints. Recommended activities include aquatic exercise, cycling, brisk walking, bodyweight exercises, stretching, yoga, and tai chi. These recommendations align with findings from meta-analyses and systematic reviews synthesizing research on physical fitness development in older adults. Evidence indicates that exercise has positive effects on strength and balance (Valenzuela et al., 2023). Resistance training has been shown to improve muscle strength in individuals over 80 years of age (Grgic et al., 2020). High-intensity interval exercise enhances cardiorespiratory fitness, body fat percentage, muscular strength, muscular endurance, and balance among older adults (Liang et al., 2024). Moreover, combining resistance training, balance training, aerobic exercise, and motor skill activities effectively improves gait, balance, mobility, and overall physical fitness in older adults (Labata-Lezaun et al., 2023). Tai chi and qigong have also been found to enhance balance and gait, contributing to fall prevention in this population (Park et al., 2023; Sherrington, 2020).

Based on the analysis, it can be concluded that older adults are capable of engaging in various forms of movement-based exercise and can develop a well-rounded exercise plan that enhances multiple components of physical fitness. For example, aerobic exercise may be performed three days per week, such as brisk walking for 50 minutes per session. Flexibility exercises can be incorporated after aerobic activity, as performing stretching post-exercise further improves overall flexibility. Strength training is recommended two days per week, using bodyweight exercises, while additional activities such as yoga and tai chi may be included to enhance balance and postural stability.

### **Technology-Assisted Exercise for Promoting Physical Activity in Older Adults**

A review of relevant literature indicates a growing integration of technology in promoting physical activity, particularly in the current era in which digital innovation is rapidly advancing. Agnes et al. (2024) highlight that smart devices and digital applications are increasingly used to support structured exercise planning through mobile applications, websites, and wearable devices that track individualized exercise data. Technology-enhanced promotion of physical activity among older adults includes wearable devices, virtual environments, and the application of artificial intelligence to personalize exercise programs (Bernardes et al., 2025). Emerging approaches have integrated augmented reality (AR) and virtual reality (VR), creating blended environments in which real-world settings are overlaid with simulated elements. These technologies enhance exercise engagement and have been shown to improve upper- and lower-body strength, flexibility, agility, cardiorespiratory fitness, handgrip strength, and balance, yielding greater benefits than traditional physical fitness interventions (Ferreira et al., 2025). Dual-task and exergaming modalities, which combine physical exercise with cognitive challenges, have also demonstrated promise. For example, Fitbrain integrates physical activity with cognitive training tasks, targeting multiple domains such as visual processing, auditory processing, tactile feedback, and writing. Such multidimensional stimulation enhances both physical fitness and cognitive functioning in older adults (Glatt et al., 2025).

From the analysis, it can be concluded that the application of digital technology plays a crucial role in supporting physical activity participation in contemporary aging populations. These technologies can be effectively linked to the FITT-VP exercise framework: wearable devices can monitor exercise frequency and intensity; mobile applications record duration and type of activity; and artificial intelligence can tailor progression levels according to an older adult's capacity. Meanwhile, virtual reality systems and exergames enhance motivation and adherence to exercise routines. Thus, the integration of digital technologies represents an important strategy for promoting physical fitness in older adults. It enables the design of exercise programs that are appropriate, safe, and sustainable, ultimately contributing to improved quality of life and long-term health maintenance.

### Exercise Intensity Levels

Exercise intensity is typically classified into three categories referred to as light, moderate, and vigorous (WHO, 2020). Light-intensity activities include standing, short bouts of walking, and completing household tasks, with an intensity ranging from 1 to 3 METs. Moderate-intensity activities encompass brisk walking, cycling, and jogging (4-6 METs). Vigorous-intensity exercise involves movements that induce substantial exertion and elevate heart rate ( $\geq 7$  METs), such as interval running or long-distance endurance running. For instance, engaging in brisk walking at an intensity of 6 METs for 40 minutes per session, three times per week, results in an energy expenditure of 240 MET-minutes per day, or 720 MET-minutes per week. Additionally, exercise intensity can be evaluated using the Borg Rating of Perceived Exertion (RPE) scale, which ranges from 0 to 10 and spans from no exertion to maximal exertion (ACSM, 2022). This measure captures both subjective perceptions and physiological responses to physical activity, making it a valuable indicator for assessing exertion levels. Health benefits generally increase as individuals initiate physical activity, yet the inverted relationship indicates that these advantages accrue only up to a threshold of exercise volume. Exceeding recommended levels or performing excessive exercise does not further enhance health and may in fact pose health risks (WHO, 2020). The optimal duration of exercise that confers health benefits is approximately 150–300 minutes per week, which corresponds to 30–60 minutes of exercise on five days per week or 1–1.40 hours of exercise on three days per week.

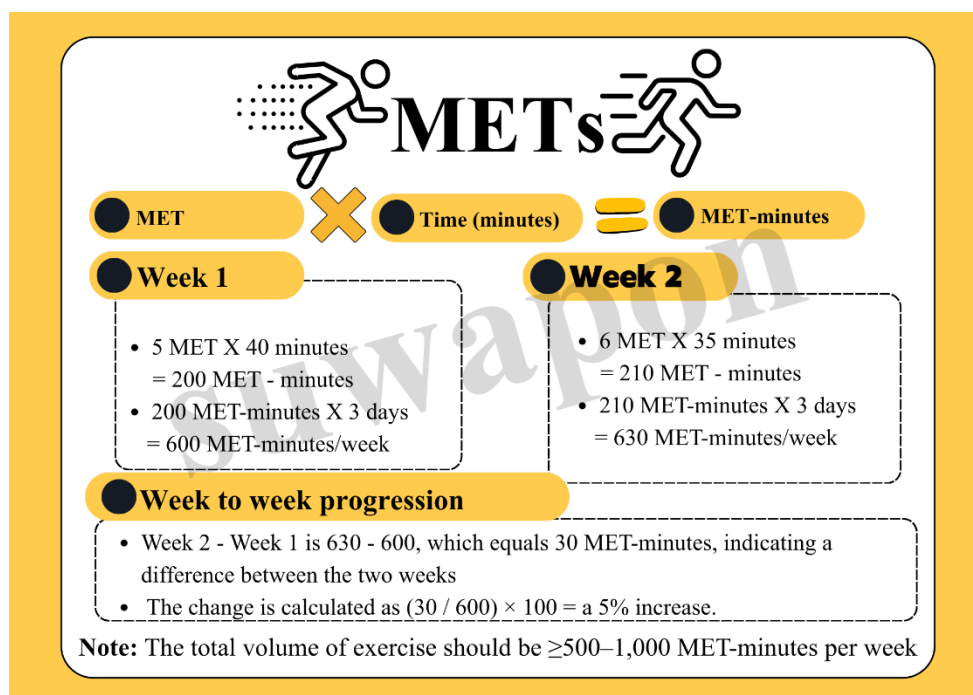


Figure 3. Example of MET-minutes calculation

### VII. Conclusion

The author synthesized research evidence and academic literature on the promotion of physical fitness among older adults in Thailand and abroad, highlighting the use of the FITT-VP principle as a framework for effective exercise planning. Systematic planning is essential for supporting daily functioning, enabling individuals to perform activities smoothly, and maintaining good physical health while reducing the risk of noncommunicable diseases. The FITT-VP principle (Frequency, Intensity, Time, Type, Volume, Pattern and Progression), recommended by the American College

of Sports Medicine (ACSM), offers a structured approach to designing exercise programs that are goal-oriented, enjoyable, safe and appropriate for older adults. Suitable exercise activities for older adults include aerobic exercises that improve cardiorespiratory endurance, such as brisk walking, jogging, cycling and swimming. These should be performed for at least 150 minutes per week at moderate intensity or 75 minutes per week at vigorous intensity. Strength and muscular endurance training, such as using dumbbells, resistance machines or body weight, should be performed at least two days per week and target all major muscle groups. Flexibility and balance training is also necessary to enhance joint mobility and reduce the risk of injury.

Assessment of progress and exercise effectiveness should utilize appropriate testing methods. Examples include the sit-and-reach test for flexibility, handgrip strength for upper-limb muscle strength, the 60-second chair stand test for muscular strength and endurance, and the 3-minute step test for cardiorespiratory fitness. In conclusion, promoting physical fitness among older adults contributes not only to improved performance in daily activities but also to long-term health. Through a review of national and international evidence, the author emphasizes that applying the FITT-VP principle is essential for planning exercise programs that effectively enhance physical fitness in this population.

## Reference

- [1.] Agnes, T., Nayak, U. U., Kulakarni, M. M., & Maiya, G. A. (2024). Physical activity promotion through digital technology among older adults with type 2 diabetes mellitus: A scoping review. *Journal of Taibah University Medical Sciences*, 19(5), 1024-1034.
- [2.] American College of Sports Medicine. (2022). *ACSM's guidelines for exercise testing and prescription*. Lippincott Williams & Wilkins.
- [3.] Bernardes, R. A., Giannouli, E., Neves, H., & Parola, V. (2025). User-centered technology for exercise optimization in older adults. *Frontiers in Sports and Active Living*, 7, 1558979.
- [4.] Boontong, T., Thosingha, O., Yuttatri, P., Thongcharoen, V., Potaya, S., Chaichan, M., ... & Nabnean, T. (2024). The situation of noncommunicable diseases among adults and older adults in urban communities of the Bangkok Metropolitan Area. *Journal of Thailand Nursing and Midwifery Council*, 39(02), 163-177.
- [5.] Chobe, M., Chobe, S., Dayama, S., Singh, A., Metri, K., Basa, J. R., & Raghuram, N. (2022). Prevalence of non-communicable diseases and its associated factors among urban elderly of six Indian states. *Cureus*, 14(10). Department of Health. (2021). *Physical Activity Promotion Plan B.E. 2561–2573 (2018–2030)*. Retrieved from <https://dopah.anamai.moph.go.th/th/e-book/3305#wow-book/>
- [6.] Ekelund, U., Tarp, J., Steene-Johannessen, J., Hansen, B. H., Jefferis, B., Fagerland, M. W., & Lee, I. M. (2019). Dose-response associations between accelerometry measured physical activity and sedentary time and all-cause mortality: systematic review and harmonised meta-analysis. *bmj*, 366.
- [7.] Ferreira, S., Marmeleira, J., Del Pozo Cruz, J., Leite, N., Bernardino, A., Moradell, A., & Raimundo, A. (2025). Effects of an exercise program with augmented reality on functional fitness and physical activity of community-dwelling older adults. *Frontiers in Sports and Active Living*, 6, 1447866.
- [8.] Fragala, M. S., Cadore, E. L., Dorgo, S., Izquierdo, M., Kraemer, W. J., Peterson, M. D., & Ryan, E. D. (2019). Resistance training for older adults: position statement from the national strength and conditioning association. *The Journal of Strength & Conditioning Research*, 33(8).
- [9.] Glatt, R. M., Patis, C., Miller, K. J., Merrill, D. A., Stubbs, B., Adcock, M., & Siddarth, P. (2024). The "FitBrain" program: implementing exergaming & dual-task exercise programs in outpatient clinical settings. *Frontiers in sports and active living*, 6, 1449699.
- [10.] Grgic, J., Garofolini, A., Orazem, J., Sabol, F., Schoenfeld, B. J., & Pedisic, Z. (2020). Effects of resistance training on muscle size and strength in very elderly adults: a systematic review and meta-analysis of randomized controlled trials. *Sports Medicine*, 50(11), 1983-1999.
- [11.] Kokkinos, P., Faselis, C., Samuel, I. B. H., Lavie, C. J., Zhang, J., Vargas, J. D., & Myers, J. (2023). Changes in cardiorespiratory fitness and survival in patients with or without cardiovascular disease. *Journal of the American college of cardiology*, 81(12), 1137-1147.

- [12.] Ramanujam, K., Thakur, J., Koralla, R. T., & Geddam, J. B. (2025). Non-communicable diseases and risk factors profiling among geriatric population residing in Hyderabad city, India. *Archives of Gerontology and Geriatrics Plus*, 2(2), 100153.
- [13.] Ramos-Álvarez, O., Roldán-Aguilar, E. E., Altamiranda-Saavedra, M., Marín, J. C., & Arufe-Giráldez, V. (2025). Effects of Exercise on Physical Fitness in Older Adults with and Without Severe Cognitive Impairment. *Behavioral Sciences*, 15(3), 351.
- [14.] Kaya Utlu, D. (2023). Description, types, and prescription of the exercise. In *Functional Exercise Anatomy and Physiology for Physiotherapists* (pp. 3-18). Cham: Springer International Publishing
- [15.] Labata-Lezaun, N., Gonzalez-Rueda, V., Llurda-Almuzara, L., Lopez-de-Celis, C., Rodriguez-Sanz, J., Bosch, J., & Perez-Bellmunt, A. (2023). Effectiveness of multicomponent training on physical performance in older adults: A systematic review and meta-analysis. *Archives of gerontology and geriatrics*, 104, 104838.
- [16.] Liang, W., Wang, X., Cheng, S., Jiao, J., Zhu, X., & Duan, Y. (2024). Effects of high-intensity interval training on the parameters related to physical fitness and health of older adults: a systematic review and meta-analysis. *Sports Medicine-Open*, 10(1), 98.
- [17.] Malina R. M. (2001). *Physical activity and fitness: pathways from childhood to adulthood*. *American journal of human biology: the official journal of the Human Biology Council*, 13(2), 162–172. [https://doi.org/10.1002/1520-6300\(200102/03\)13:2<162::AID-AJHB1025>3.0.CO;2-T](https://doi.org/10.1002/1520-6300(200102/03)13:2<162::AID-AJHB1025>3.0.CO;2-T)
- [18.] Milani, J. G. P. O., Milani, M., Verboven, K., Cipriano Jr, G., & Hansen, D. (2024). Exercise intensity prescription in cardiovascular rehabilitation: Bridging the gap between best evidence and clinical practice. *Frontiers in cardiovascular medicine*, 11, 1380639.
- [19.] Montien, S., & Jaruchart, T. (2022). Effects of Recreational Program on Health-Related Physical Fitness and Balance in the Elderly (Doctoral dissertation, Naresuan University).
- [20.] National Commission for Health Education Credentialing, Inc. (2026). Retrieved from. <https://www.nchec.org/about>
- [21.] National Statistical Office Ministry of Digital Economy and Society. (2024) The 2024 Survey of The Older Persons in Thailand, (2024) Retrieved from [https://www.nso.go.th/nsoweb/storage/survey\\_detail/2025/20241209\\_145003\\_88327.pdf](https://www.nso.go.th/nsoweb/storage/survey_detail/2025/20241209_145003_88327.pdf)
- [22.] Ortega, F. B., Ruiz, J. R., Castillo, M. J., & Sjörström, M. (2008). Physical fitness in childhood and adolescence: a powerful marker of health. *International journal of obesity*, 32(1), 1-11.
- [23.] Park, M., Song, R., Ju, K., Shin, J. C., Seo, J., Fan, X., ... & Li, Y. (2023). Effects of Tai Chi and Qigong on cognitive and physical functions in older adults: systematic review, meta-analysis, and meta-regression of randomized clinical trials. *BMC geriatrics*, 23(1), 352.
- [24.] Phan, D. Q., Zheng, C., Thai, T., Hammershaimb, B., Gyurjian, K., Patel, S., Chen, A., & Lee, M. S. (2022). Cardiorespiratory Fitness and Mortality in Patients Aged 60 to 90 Years. *The American journal of cardiology*, 170, 132–137. <https://doi.org/10.1016/j.amjcard.2022.01.035>
- [25.] Ramanujam, K., Thakur, J., Koralla, R. T., & Geddam, J. B. (2025). Non-communicable diseases and risk factors profiling among geriatric population residing in Hyderabad city, India. *Archives of Gerontology and Geriatrics Plus*, 2(2), 100153.
- [26.] Rashmi, R., & Mohanty, S. K. (2023). Examining chronic disease onset across varying age groups of Indian adults using competing risk analysis. *Scientific Reports*, 13(1), 5848.
- [27.] Riebe, D., Ehrman, J. K., Liguori, G., & Magal, M. (2018). ACSM's guidelines for exercise testing and prescription. American College of Sports Medicine.
- [28.] Samahito, S. (2006). Development of physical fitness tests and normative standards related to health for Thai children aged 7–18 years. Research report. P.S. Print, Nonthaburi, Thailand.
- [29.] Siedentop D, van der Mars H. Introduction to physical education, fitness & sport. 8. New York, NY: McGraw-Hill; 2012.

- 
- [30.] Sherrington, C., Fairhall, N., Wallbank, G., Tiedemann, A., Michaleff, Z. A., Howard, K., ... & Lamb, S. (2020). Exercise for preventing falls in older people living in the community: an abridged Cochrane systematic review. *British journal of sports medicine*, 54(15), 885-891.
- [31.] Whelton, S. P., McAuley, P. A., Dardari, Z., Orimoloye, O. A., Michos, E. D., Brawner, C. A., ... & Al-Mallah, M. H. (2021, September). Fitness and mortality among persons 70 years and older across the spectrum of cardiovascular disease risk factor burden: the FIT project. In *Mayo Clinic Proceedings* (Vol. 96, No. 9, pp. 2376-2385). Elsevier.
- [32.] World Health Organization. (2020) *Guidelines on physical activity and sedentary behaviour*. World Health Organization
- [33.] World Health Organization. (2021). *Guidelines on physical activity and sedentary behaviour: at glance*. World Health Organization.
- [34.] World Health Organization. (2022). *Physical activity and sedentary behaviour: a brief to support older people*. World Health Organization.
- [35.] World Health Organization. (2024) *Noncommunicable diseases*. Retrieved from <https://www.who.int/news-room/fact-sheets/detail/noncommunicable-diseases>.
- [36.] World Health Organization. (2024) *Physical activity*. Retrieved from <https://www.who.int/news-room/fact-sheets/detail/physical-activity>
- [37.] Wuttisetpaiboon, P., Wongsila, S., Sureephong, P., Aslam, N., Hu, S., & Shahid, A. (2024, July). *Personalized Exercise Plans for the Elderly Using KNN Based on FITT Principle*. In IFIP International Conference on Product Lifecycle Management (pp. 343-353). Cham: Springer Nature Switzerland.
- [38.] Valenzuela, P. L., Saco-Ledo, G., Morales, J. S., Gallardo-Gómez, D., Morales-Palomo, F., López-Ortiz, S., & Lucia, A. (2023). Effects of physical exercise on physical function in older adults in residential care: a systematic review and network meta-analysis of randomised controlled trials. *The lancet Healthy longevity*, 4(6), e247-e256.