Physical Activity Guide for Health Promotion 2023

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Review Committee on the Revision of Physical Activity Reference for Health Promotion 2013

Health Service Bureau, Ministry of Health, Labour and Welfare

CONTENTS

1. Introduction

⑴ The Significance of Physical Activity for Health Promotion

The term “physical activity” refers to all movements involving skeletal muscle contractions that consume more energy than when at rest. The expression “exercise” refers to physical activities that are planned and performed regularly to maintain or improve health and fitness, such as sports and fitness activities. Individuals who engage in more physical activity have a lower risk of developing cardiovascular diseases, type 2 diabetes, cancer, locomotive syndrome*1, depression, and dementia than those who engage in less physical activity[1]. Corroborating these benefits, the guidelines on physical activity and sedentary behaviour published by the World Health Organization (WHO) in 2020 describe that physical activity helps prevent cardiovascular diseases, type 2 diabetes, and cancer, reduces depression and anxiety symptoms, and enhances cognitive function, learning abilities, and overall well-being[2]. Physical activity is also described as providing health benefits for all, including pregnant and postpartum women and individuals with chronic diseases and disabilities. This makes it important for all citizens to engage in physical activity.

Regarding physical inactivity, it is ranked by the WHO as the fourth leading risk factor for mortality globally, following high blood pressure, smoking, and high blood glucose[3]. In Japan, physical inactivity is reportedly the third leading risk factor of death due to non-communicable diseases, following smoking and high blood pressure[4]. Because of these adverse effects, efforts aimed at improving the recognition and practice of physical activity among the general public may be beneficial for the extension of healthy life expectancy in Japan, which is transitioning into a super-aging society.

1 Ministry of Health, Labour, and Welfare. Physical Activity Reference for Health Promotion 2013. https://www.mhlw.go.jp/stf/houdou/2r9852000002xple.html
2 World Health Organization. Guidelines on physical activity and sedentary behaviour. 2020. https://www.who.int/publications/i/item/9789240015128
3 World Health Organization. Global health risks: mortality and burden of disease attributable to selected major risks. 2009. https://www.who.int/publications/i/item/9789241563871
4 Ikeda N, Saito E, Kondo N, Inoue M, Ikeda S, Satoh T, et al. What has made the population of Japan healthy? The Lancet. 2011;378(9796):1094-1105.

⑵ The Purpose of Revising the Physical Activity Reference for Health Promotion 2013

In Japan, the formulation and release of guidelines for physical activity began in 1989 with the publication "Exercise Requirements for Health Promotion." This was followed by "Exercise Guidelines for Health Promotion" in 1993, as well as "Exercise References for Health Promotion 2006" and "Exercise Guidelines for Health Promotion 2006 (Exercise Guide 2006)" in 2006. The year 2013 saw the commencement of the "Second Term of the National Health Promotion Movement in the 21st Century (Health Japan 21 (the second term))," and the formulation of the "Physical Activity References for Health Promotion 2013" and the "Physical Activity Guidelines for Health Promotion (Active Guide)." Utilizing these reference and guidelines and under the scope of the "Health Japan 21 (the second term)" movement, efforts have been promoted in the field of physical activity in Japan.

Ten years have passed since the formulation of the "Physical Activity References for Health Promotion 2013,"during which much new scientific knowledge regarding physical activity has accumulated. In the "Final Evaluation of Health Japan 21 (the second term),"[5] it was noted that some commonly employed indicators in the field of physical activity, namely "number of steps in daily life" and "percentage of individuals with exercise habits," have shown either stagnation or a declining trend of use in academic settings. Some of the potential contributing factors include changes in the living environment, such as the advancement of mechanization, automation, and the development of transportation means, which have reduced walking opportunities in workplaces, households, and commuting.

Furthermore, evidence exists that efforts to promote physical activity or develop environments conducive to physical activity remain insufficient. Accordingly, to further promote physical activity initiatives in line with the latest scientific evidence, the "Physical Activity Reference for Health Promotion 2013" was revised and are replaced by the "Physical Activity Guide for Health Promotion 2023."

This guide includes not only quantitative recommendations (e.g.,"engage in physical activity with an intensity equivalent to or greater than that of walking for at least 60 minutes a day") but also qualitative recommendations (e.g.,"adjust the intensity and amount based on individual abilities and start with what is feasible"). Additionally, in light of the potential for the term "reference" to lead to misinterpretation that "all citizens" should engage in the same activities, the term "guide" was chosen instead. This guide provides recommendations for physical activity tailored to different target groups (i.e., adults, children, and older adults), provides reference information regarding physical activity, and is designed to fully considers its future usability as a tool.

5 Ministry of Health, Labour, and Welfare. Final Evaluation of Health Japan 21 (the second term). 2021. https://www.mhlw.go.jp/stf/seisakunitsuite/bunya/kenkou_iryou/kenkou/kenkounippon21.html

⑶ The Concepts of Physical Activity

This guide recommends the following definitions of physical activity, lifestyle activities, exercise, and sedentary behaviour.

Physical Activity: All movements involving skeletal muscle contractions that consume more energy than when at rest.

Lifestyle Activities: A subset of physical activities, including activities associated with daily life (e.g., household chores, work, commuting, and attending school).

Exercise: A subset of physical activities, specifically planned and regularly performed to maintain or improve health and fitness (e.g., sports and fitness activities).

Sedentary Behaviour: All waking activities performed in a seated or reclined/lying position with an energy expenditure of 1.5 METs[6] or less (e.g., desk work, watching television, and using a smartphone while sitting or lying down).

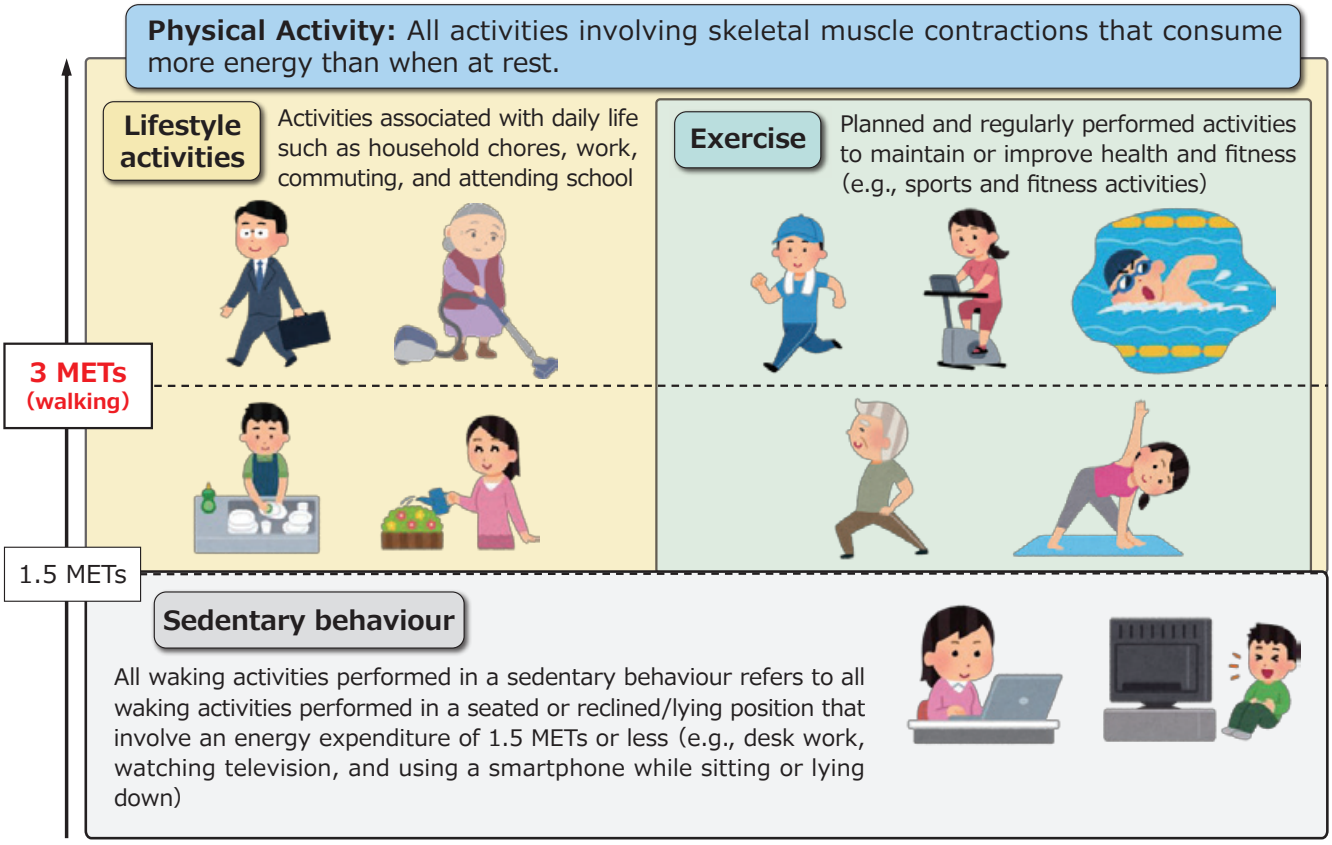

Fig. 1: Conceptual diagram of physical activities, lifestyle activities, exercise, and sedentary behaviour

6 The metabolic equivalent of task (MET) is a measure of physical activity intensity, with 1 MET being the energy expenditure at rest. Specifically, it indicates how many times more an activity consumes energy compared to a resting state. For a list of physical activity intensities in METs, refer to the reference materials. Energy expenditure from physical activity (kcal) can be estimated using the following formula: METs × Time (hours) × Weight (kg). For example, if a person weighing 50 kg walks for 30 minutes (3 METs), the energy expenditure can be estimated as follows: 3 (METs) × 0.5 (hours) × 50 (kg) = 75 kcal.

2. Goals of "Health Japan 21 (the third term)" and Utilization Strategies for this Guide

(1) Goals of "Health Japan 21 (the third term)" for Physical Activity

In May 2023, the Ministry of Health, Labour, and Welfare of Japan announced its basic policy[7] for the "Third Term of the National Health Promotion Movement in the 21st Century (Health Japan 21 (the third term))," which would commence in 2024. Its goals regarding physical activity include "increasing the number of daily steps," "increasing the percentage of individuals with exercise habits," "reducing the number of children who do not regularly engage in exercise or sports," and "increasing the number of municipalities working on creating 'comfortable and walkable' environments." Each of these goals has corresponding target values, as shown in Figure 2.

<table>
<tr><th>Goals</th><th>Indicators</th><th colspan="2">Current values (2019)</th><th colspan="2">Target values (2032)</th></tr>
<tr><td rowspan="5">Increasing the number of steps in daily life</td><td rowspan="5">Average number of daily steps</td><td colspan="2">Total: 6,278 steps</td><td colspan="2">Total: 7,100 steps</td></tr>
<tr><td>20–64 years</td><td>65 years or older</td><td>20–64 years</td><td>65 years or older</td></tr>
<tr><td>Male
7,864 steps</td><td>Male
5,396 steps</td><td>Male
8,000 steps</td><td>Male
6,000 steps</td></tr>
<tr><td>Female
6,685 steps</td><td>Female
4,656 steps</td><td>Female
8,000 steps</td><td>Female
6,000 steps</td></tr>
<tr><td colspan="2"></td><td colspan="2">(Current value × 1.1)</td></tr>
<tr><td rowspan="5">Increasing the percentage of individuals with exercise habits*
*Engaging in exercise two days or more per week, with each session lasting 30 minutes or more, continuously for one year or more</td><td rowspan="5">Percentage of individuals with exercise habits</td><td colspan="2">Total: 28.7%</td><td colspan="2">Total: 40%</td></tr>
<tr><td>20–64 years</td><td>65 years or older</td><td>20–64 years</td><td>65 years or older</td></tr>
<tr><td>Male
23.5%</td><td>Male
41.9%</td><td>Male
30%</td><td>Male
50%</td></tr>
<tr><td>Female
16.9%</td><td>Female
33.9%</td><td>Female
30%</td><td>Female
50%</td></tr>
<tr><td colspan="2"></td><td colspan="2">(Current value +10%)</td></tr>
<tr><td>Reducing the number of children who do not regularly engage in exercise or sports</td><td>Percentage of children engaging in a total exercise time per week (excluding physical education classes) of 60 minutes or less</td><td colspan="4">Set targets per Basic Policy on Child Health and Development (Second Term)</td></tr>
<tr><td>Increasing the number of municipalities working on creating "comfortable and walkable" environments</td><td>Number of municipalities that have created "comfortable and walkable" environments</td><td colspan="2">73
(December 2022)</td><td colspan="2">100
(2025)</td></tr>
</table>

Fig. 2: Goals and indicators of physical activity according to "Health Japan 21 (the third term)"

7 Ministry of Health, Labour, and Welfare. Final Evaluation of Health Japan 21 (the third term). 2023. https://www.mhlw.go.jp/stf/seisakunitsuite/bunya/kenkou_iryou/kenkou/kenkounippon21_00006.html

⑵ Utilization Strategies for this Guide

The participation of various stakeholders is essential to promote the National Health Promotion Movement. This guide is formulated based on scientific knowledge and aims to advance initiatives in the field of physical activity. It is intended for professionals involved in health promotion (e.g., health fitness instructors, public health nurses, dietitians, and physicians), policymakers (e.g., in health promotion and urban planning departments), workplace managers, and other stakeholders supporting physical activity in the health, medical, and nursing care sectors.

In “Health Japan 21 (the third term),” the emphasis is placed on “promoting more effective initiatives (Implementation).” To achieve these goals, the government plans to present specific measures (action plans) to support the efforts of local governments and other entities. Going forward, it is necessary to consider effective methods for disseminating this guide and its contents to the public. Importantly, the effectiveness of these methods may hinge on considerations of the social environments that may lead to a decrease in the amount of engagement in physical activity among the general public such as industries that undergo industrial structure changes, environments affected by advancements in mechanization and automation, changes in transportation methods, and the increase in remote work due to the spread of emerging infectious diseases. There is therefore the need to give due attention to these topics. The widespread use of smartphones and wearable devices has also led to the rapid development of environments where individuals can access and utilize their health information through information and communication technology services (e.g., such as Personal Health Records, also known as PHR). Accordingly, the use of digital technologies to visualize a person's physical activity status has become an important means for further advancing initiatives in the field of physical activity.

3. Recommendations

Overview of the Recommendations in this Guide

In “Health Japan 21 (the third term),” the emphasis is placed on promoting health with special consideration for life stages (i.e., each phase of a person’s life, including childhood, adulthood, and old age) and the life course approach (i.e., health promotion from the perspective of the course of a person’s life from fetus to old age). In accordance with such emphasis, this guide summarizes recommendations for physical activity for each life stage (i.e., childhood, adulthood, and old age), and provides additional information for reference on various themes regarding physical activity engagement.

In promoting physical activity initiatives, it is fundamental to help people avoid prolonged sitting and encourage them to move their body even if only slightly more than before. This guide therefore introduces a new concept for sedentary behaviour, recommending that even those who have difficulty standing should make efforts to move their body as much as possible and to avoid prolonged inactivity periods.

As mentioned, the recommendations presented in this guide are based on numerous scientific papers and up-to-date data on the Japanese population. However, the implementation of these recommendations requires consideration of individual differences (e.g., in health status, fitness level, and physical function), relevant adjustments for activity intensity and amount, and a starting plan that considers feasible activities and goals.

Overall directionality

Consider individual differences, adjust the activity intensity and amount accordingly, and start with feasible activities and goals

<table>
<tr><th>Subjects*1</th><th colspan="2">Physical activity</th><th>Sedentary behaviour</th></tr>
<tr><td>Older adults</td><td>40 minutes/day or more of physical activity in the form of walking or an equivalent or more intense activity (the activity should be at an intensity of 3 METs or more; approx. 6,000 steps or more daily, which equates to 15 MET-hours/week or more)</td><td>Exercise
Engage in various types of exercise at least 3 days a week (e.g., aerobic exercise, strength training, balance exercises, and flexibility exercises).
[Strength training*2 should preferably be practiced 2 to 3 days/ week]</td><td rowspan="2">Be mindful to avoid prolonged sitting
(Even for those with difficulty standing, make efforts to move the body as much as possible and to avoid long inactivity periods)</td></tr>
<tr><td>Adults</td><td>60 minutes/day or more of physical activity in the form of walking or an equivalent or more intense activity (the activity should be at an intensity of 3 METs or more; approx. 8,000 steps or more daily, which equates to 23 MET-hours/week or more)</td><td>Exercise
60 minutes/week or more of exercise that leaves you short of breath and sweating or more (at an intensity of 3 METs or more, which equates to 4 MET-hours/week or more)
[Strength training*2 should preferably be practiced 2 to 3 days/week]</td></tr>
<tr><td>Children
(Children engaging in little physical activity*3)</td><td colspan="3">(Reference)
・Engage in moderate-intensity or higher (3 METs or more) physical activity (primarily aerobics) for at least 60 minutes/day.
・Perform high-intensity aerobic activities or activities that strengthen muscles and bones at least 3 days a week.
・Reduce prolonged sitting time regardless of the total amount of physical activity. Specifically, decrease leisure screen time.</td></tr>
</table>

*1 Owing to significant individual differences in physical condition influenced by lifestyle habits, living patterns, and environmental factors, it is not appropriate to categorize “older adults,” “adults,” and “children” strictly by specific age ranges. This highlights the importance of undertaking initiatives tailored to individual circumstances.

*2 Exercise aimed at improving muscle strength by applying resistance, including weight training (e.g., using machines and dumbbells) and body-weight exercises (e.g., push-ups and squats).

*3 Time spent in front of screens, such as watching TV or DVDs, playing video games, or using smartphones.

Fig. 3: List of recommendations

RECOMMENDATION 1

ADULTS

RECOMMENDATIONS

- Consider individual differences, adjust the activity intensity and amount, and start with feasible activities and goals. Move the body more than before, even if only slightly more.
- The recommendation encourages individuals to engage in physical activity with an intensity of 3 METs or more for at least 23 MET-hours/week. Specifically, physical activities such as walking (or activities of equivalent intensity) are recommended to be performed for at least 60 minutes/day (i.e., equivalent to about 8,000 steps/day).
- The recommendation is to engage in exercise with an intensity of 3 METs or more for at least 4 MET-hours/week. Specifically, exercises that makes you breathless and sweat are recommended to be performed for at least 60 minutes/week.
- The recommendation suggests performing strength training 2 to 3 days a week. This can be included in the 4 MET-hours/week of exercise.
- Be mindful of and make efforts to move the body as much as possible, avoid sedentary behaviour (e.g., prolonged sitting), and avoid long inactivity periods. This is applicable even for those with difficulty standing.

1 Recommendations and description of specific examples

- Physical activity refers to all movement involving skeletal muscle contractions that consume more energy than when at rest. Physical activity can be classified into two types, as follows: "lifestyle activities," including daily activities such as household chores, work, commuting, and school activities; "exercise," referring to planned, regularly performed activities to maintain and/or improve health and physical fitness.
- The metabolic equivalent of a task (MET) is a measure of physical activity intensity, with 1 MET being the energy expenditure at rest. Specifically, it indicates how many times more an activity consumes energy compared to a resting state. For example, the intensity of walking is equivalent to 3 METs. MET-hours is a unit of total activity amount, which is calculated by multiplying the MET value by the duration of the activity in hours.
- Engaging in physical activity or exercise with an intensity of 3 METs or more, such as walking for 60 minutes (i.e., approximately 6,000 steps), every day roughly equates to 23 MET-hours/week. Additionally, engaging in lifestyle activities of less than 3 METs (e.g., household chores) is equivalent to about 2,000 steps/day. Therefore, the recommended total daily amount of physical activity or exercise is approximately 8,000 steps.
- Please see "Strength Training" for more information on strength training.
- Sedentary behaviour refers to all waking activities performed in a seated or reclined/lying position with an energy expenditure of 1.5 METs or less. Examples include desk work, watching TV, or using a smartphone in a seated or reclined/lying position.

2 Scientific rationale

- Regarding the recommended values for engagement in physical activity, a review of cohort studies targeting adults [1] found that the lower limit of effective physical activity for preventing lifestyle-related diseases ranges between 19–26 MET-hours/week (range average: 23 MET-hours/week). Additionally, a meta-analysis of studies focusing on Japanese individuals confirmed that those engaging in more than 22.5 MET-hours/week of physical activity had beneficial effects [2]. Therefore, the recommended level of physical activity is 23 MET-hours/week.
- Regarding the recommended values for engagement in exercise, the lower limit of effective exercise for preventing lifestyle-related diseases ranges between 2–10 MET-hours/week. The average of this range is 4 MET-hours/week, which is the recommended exercise level. A review of the latest research on exercise confirmed trends similar to those in past reviews, indicating no need for changes in the recommended values.
- There is a relationship between engagement in physical activity and the risk of lifestyle-related diseases or mortality, where higher amounts of physical activity are associated with lower risks of lifestyle-related diseases and mortality. This risk reduction is particularly significant up to about 23 MET-hours/week [3] (Fig. 1). Additionally, increasing physical activity by 10 minutes/day is estimated to reduce the risk of lifestyle-related diseases or mortality by approximately 3% [3-5]. There is also a comparable relationship between exercise volume and the risk of lifestyle-related diseases or mortality. Meeting the threshold of 4 MET-hours/week is associated with a roughly 10% lower risk of these outcomes [3].
  While the upper limit of beneficial physical activity is not yet clear, it is important to be mindful of injuries and overall health, avoiding overexertion.
- A meta-analysis [6] of 34 cohort studies examining the relationship between sedentary time and mortality reported an increase in the latter with longer sedentary time (Figure 2). However, engaging in moderate-to-vigorous physical activity for 60 minutes or more per day can mitigate the mortality associated with sedentary behaviour [7]. Additionally, frequently

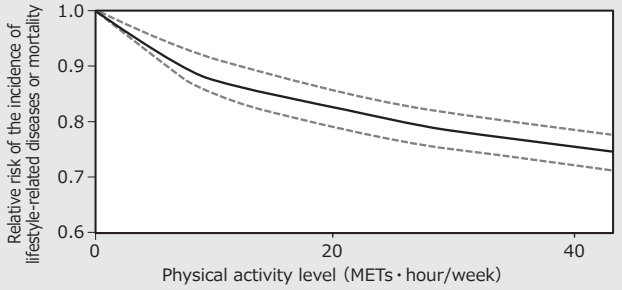

Fig. 1 Physical activity level and relative risk of the incidence of lifestyle-related disease/mortality

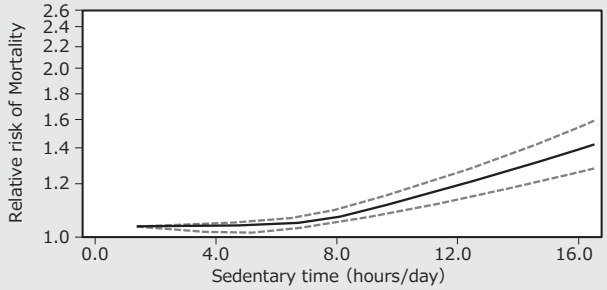

Fig. 2 Sedentary time and mortality

interrupting long periods of engagement in sedentary behaviour (e.g., every 30 minutes) is important for reducing cardiovascular and metabolic disease risks (e.g., postprandial blood glucose levels, triglycerides, and insulin resistance)[8]. Even minor physical movements can positively impact health[9]. The recommendation of avoiding prolonged periods of inactivity and engaging in small physical movements whenever possible is applicable even to those with difficulty standing.

3 Current status

- The National Health and Nutrition Survey has been conducting long-term studies on steps and exercise habits in Japan. The results from the 2019 survey showed that the average number of steps/day for individuals aged 20 and older was 6,278 ±4,231 (men: 6,793 ±4,564; women: 5,832 ±3,863)[10]. Meanwhile, the trend over the years indicates a decrease in the average number of steps for both men and women (Figure 3). Regarding exercise habits, 28.7% of individuals aged 20 and older engaged in exercise for at least 30 minutes/session, at least twice a week, and maintained this routine for over a year (men: 33.4%; women: 25.1%).
- Sedentary behaviour is a relatively new concept, and unlike step counts and exercise habits, there are no longitudinal surveys on this topic yet. Nonetheless, according to the 2013 National Health and Nutrition Survey[11], 38% of men and 33% of women reported sitting for eight hours or more on a typical weekday (Figure 4). Additionally, a study examining total sedentary time on weekdays across 20 countries found that Japanese people have a notably high sedentary time compared to other countries[12].

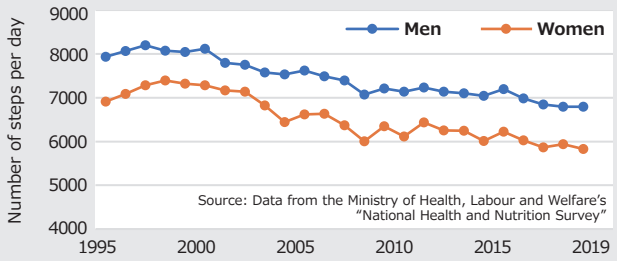

Fig. 3 Changes in the average number of steps per day among Japanese adults over the years

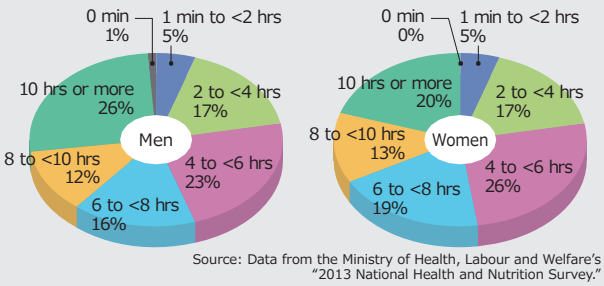

Fig. 4 Average rate of sedentary time per day among Japanese adults

4 What must be worked on?

- Considering individual differences, adjusting physical activity or exercise intensity and volume according to individual needs, and starting with feasible activities and goals are all important measures.
- Since it may be difficult for the general public to understand what the recommendation of "engaging in physical activity with an intensity of 3 METs or more for 23 MET-hours/week or more" actually means, the recommendation should be reframed to "engaging in at least 60 minutes/day" or "at least 8,000 steps/day" as rough equivalents. Compliance with these recommendations holds the potential to help mitigate the health risks associated with prolonged sedentary behaviour.
- Let us encourage all to reduce their sedentary time, even if just a little, and increase their current physical activity level. It is important to move your body not only through exercise but also through engagement in daily activities. For example, you can increase your physical activity through engagement in household chores (e.g., shopping, laundry, and cleaning) or active commuting (e.g., biking or walking to work). Additionally, using spare moments during housework or work to do exercises can also be effective.

5 Frequently asked questions and answers (Q&A)

Q: Is there a minimum physical activity duration or frequency that must be met to see benefits, such as "at least 20 minutes of continuous activity per session" or "at least 3 times/week"?

A: There are no such minimum duration or frequency requirements. Accumulating short periods of activity can also provide health benefits[3-5]. Additionally, even engagement in physical activity once a week can have positive health effects[13]. This highlights the importance of incorporating physical activity into one's lifestyle in a way that suits the individual.

Q: For health, is it necessary for all adults to meet the amounts of physical activity recommended in this guide?

A: No, it is not necessary. The desirable amount of physical activity for health varies by individual. Please consider these recommendations only as general guide.

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RECOMMENDATION 2

CHILDREN AND ADOLESCENTS

RECOMMENDATIONS

- Children and adolescents with limited engagement in physical activity should participate in, even if just a little, some form of physical activity.
  The WHO's "Guidelines on Physical Activity and Sedentary Behaviour (2020)" recommend the following:
  - ✓ Children and adolescents are recommended to engage in at least 60 minutes of moderate-to-vigorous physical activity (mainly aerobic activity) per day.
  - ✓ Children and adolescents should participate at least 3 days/week in high-intensity aerobic activities or activities that strengthen muscles and bones.
  - ✓ Reduce the amount of time spent sitting, especially screen time (e.g., watching TV or DVDs, playing games, or using smartphones).
- Be cautious of overly intense exercise and overexertion (excessive engagement).

1 Recommendations and description of specific examples

- Physical activity refers to all movements involving skeletal muscle contractions that consume more energy than when at rest. Physical activity can be classified into two types, as follows: "lifestyle activities," including daily activities like commuting to school or helping with household chores; "exercise," referring to planned, regularly performed activities to maintain and/or improve health and physical fitness (e.g., sports, physical education classes, or activities at sports clubs).
- Aerobic physical activity refers to activities that use oxygen to metabolize carbohydrates and fats for energy and typically place a relatively light strain on the muscles.
- The metabolic equivalent of task (MET) is a measure of physical activity intensity, with 1 MET being the energy expenditure at rest. Specifically, it indicates how many times more an activity consumes energy compared to a resting state. Activities with an intensity of 3 to 5.9 METs, where you may start to breathe a bit harder, are of moderate intensity, while high-intensity activities are those with an intensity of 6 METs or more.
- Sedentary behaviour refers to all waking activities performed in a seated or reclined/lying position with an energy expenditure of 1.5 METs or less. Screen time refers to the amount of time spent in front of a screen, such as watching TV or DVDs, playing video games, or using smartphones.

2 Scientific rationale

Background

- To date, two guidelines addressing physical activity recommendations for children, targeting early childhood and school-aged children, have been established in Japan. First, the Ministry of Education, Culture, Sports, Science and Technology's Early Childhood Physical Activity Guidelines [1] suggests that through building a foundation for exercise habits, children can acquire diverse movements and basic physical fitness and motor skills. The goal of engagement in physical activity is to nurture motivation for various activities, social skills, and creativity. The guidelines recommend that children engage in fun physical activities for at least 60 minutes daily, primarily through various forms of play. Second, the Japan Sports Association's Active Child 60min. Guideline [2] for elementary school students recommends children engage in physical activities (e.g., play, daily life activities, and physical education or sports) for at least 60 minutes daily.

Scientific rationale overseas

- The WHO's "Guidelines on Physical Activity and Sedentary Behaviour (2020)" [3] umbrella review of health for children and adolescents aged 5–17 years provides us with the following knowledge.

Physical activity

Is there a relationship between physical activity and health?

- Engagement in physical activity improves physical fitness (i.e., overall endurance and muscle strength), cardiovascular and metabolic function (i.e., blood pressure, lipid metabolism, blood glucose levels, insulin resistance), bone health, cognitive function, and mental health. It also supports obesity reduction.
- An increase in moderate-to-vigorous physical activity engagement is associated with all the dimensions mentioned in the prior paragraph, and is effective for healthy body weight management.

Does the relationship between physical activity and health vary depending on physical activity type and occasion?

- Moderate-to-vigorous aerobic physical activity improves overall endurance, while activities that involve significant muscle exertion (e.g., jumping) enhance muscle strength. Specifically, previous guidelines recommend children and adolescents engage in activities that strengthen muscles and bones at least 3 days a week.

Sedentary behaviour

Is there a relationship between sedentary behaviour and health?

- Prolonged sitting is associated with increased obesity, decreased physical fitness, social behaviour difficulties, and reduced sleep duration. It is also linked to lower physical fitness and endurance, while extended screen time (e.g., watching TV or playing video games) is associated with poor mental health and social behaviour indicators. Spending excessive time on screens has also been reported to negatively impact sleep duration.

Does the relationship between sedentary behaviour and health vary depending on sedentary behaviour type and occasion?

- Currently, screen time (e.g., watching TV) is often addressed as a type of sedentary behaviour, while evidence regarding the impact of sedentary behaviour on health outcomes generally shows that screen time has a stronger association with health outcomes compared to total sitting time.

3 Current status

- In the 2022 National Physical Fitness, Exercise Ability, and Exercise Habit Survey, children's total daily time spent on exercise (including physically active play) and sports (excluding physical education classes) were assessed (Figure

1). The percentages of children with less than 60 minutes/week were 9% for boys and 15% for girls in the fifth grade, and 8% and 18%, respectively, in the second year of junior high school. Furthermore, the percentages of children with 420 minutes or more/week were 50% and 29%, respectively, in the fifth grade, and 78% and 58%, respectively, in the second year of junior high school.

- Additionally, the percentages of children and adolescents who spent more than 2 hours/day watching TV or playing video games outside of a learning context were 62% for boys and 54% for girls in the fifth grade, and 73% and 70%, respectively, in the second year of junior high school (Figure 2).

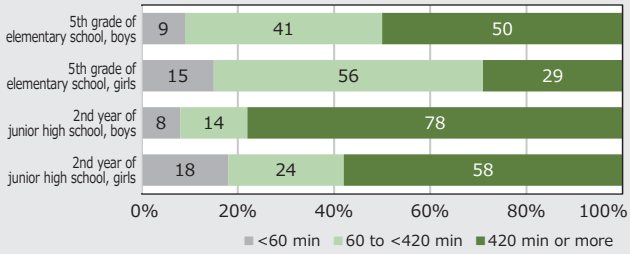

Fig. 1 Total number of hours of exercise per week among children and adolescents[4)]

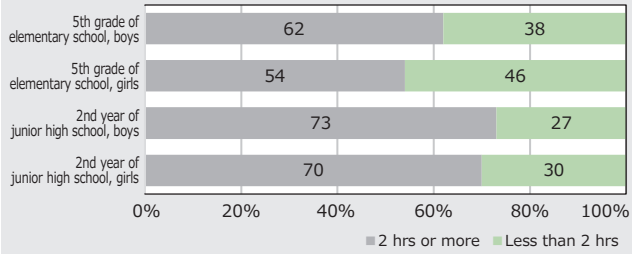

Fig. 2 Time spent looking at screens (e.g., TV and video games) per day among children and adolescents[4)]

4 What must be worked on?

- For children and adolescents with low levels of physical activity, engaging in an average of at least 60 minutes/day throughout the week and in various settings (e.g., school, home, and after-school activities near the home) contributes to better health. It is beneficial to engage in some form of physical activity rather than engaging in sedentary behaviour.
- Instead of abruptly starting with high-intensity or high-frequency physical activity, start with small amounts of physical activity and gradually increase the intensity, frequency, and duration over time.
- Regardless of physical activity duration, the goal should be to reduce leisure screen time and avoid long periods of sedentary behaviour (e.g., sitting).
- Parents and/or teachers should ensure that children can participate in enjoyable, age-appropriate, diverse physical activities, as well as provide them with safe and equitable opportunities for physical activity engagement.

5 Frequently asked questions and answers (Q&A)

Q: Is there anything a child and adolescent should be careful of when engaging in physical activities?

A: Intense exercises and/or overexertion can lead to injuries. For example, the "Comprehensive Guidelines on the Organization of School Club Activities and New Community Club Activities" [6)] recommends setting aside at least 2 rest days/week and limiting daily activity time to around 2 hours on weekdays and about 3 hours on weekends.

Q: My child moves around a lot and does not spend much time sitting. Should he/she still reduce the time he/she spends sitting?

A: Even if you are active throughout the day, long sitting periods during leisure time have been reported to be detrimental to health. However, not all sitting behaviours are harmful. For example, sitting activities such as reading or doing homework outside of school have been associated with higher academic achievement [7,8)], indicating that the outcomes of sitting behaviours can vary depending on the context of the sitting behaviour. This once more emphasizes the importance of managing and limiting leisure screen time to avoid excessive sitting behaviour.

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RECOMMENDATION 3

OLDER ADULTS

RECOMMENDATIONS

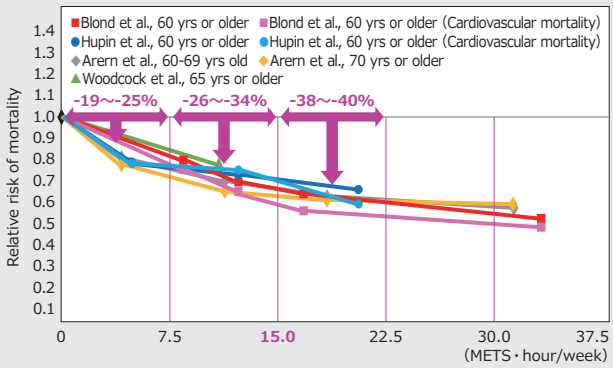
- Consider individual differences, adjust the activity intensity and amount accordingly, and start with feasible activities and goals. Move the body more than before, even if only slightly more.
- Engage in physical activity with an intensity of 3 METs or more for at least 15 MET-hours/week. Specifically, aim for at least 40 minutes of walking, or a physical activity of equivalent intensity, per day (i.e., around 6,000 steps/day).
  - ✓ Engagement in any amount of physical activity is encouraged, even if the above intensity and recommended values are not fully met.
  - ✓ For older adults with good physical fitness, engaging in a physical activity level equivalent to the adult recommendation (at least 23 MET-hours/week) may provide additional health benefits.
- Engage in multicomponent exercises that include strength, balance, and flexibility at least 3 days/week.
- Engage in strength training 2 to 3 days/week (this can be included in the multicomponent exercises).
- For older adults with decreased physical function, the recommendation is for physical activity to be accompanied by safety precautions and for these older adults to be mindful of fall risks.
- Be cautious of excessive sedentary behaviour (sitting or lying down), of prolonged periods of inactivity, and try to move the body periodically. This is applicable even to older adults with difficulty standing.

1 Recommendations and description of specific examples

- Physical activity refers to all movements involving skeletal muscle contractions that consume more energy than when at rest. Physical activity can be classified into two types, as follows: "lifestyle activities," including daily activities such as household chores, work, commuting, and attending school; "exercise," referring to planned, regularly performed activities to maintain and/or improve health and physical fitness.
- The metabolic equivalent of task (MET) is a measure of physical activity intensity, with 1 MET being the energy expenditure at rest. Specifically, it indicates how many times more an activity consumes energy compared to a resting state. For example, the intensity of walking is equivalent to 3 METs. MET-hours is a unit of activity level, which is calculated by multiplying the MET value by the duration of the activity in hours.
- Engaging in physical activity with an intensity of 3 METs or more, such as walking for 40 minutes (i.e., approximately 4,000 steps), every day roughly equates to 15 MET-hours/week. Additionally, engaging in lifestyle activities of less than 3 METs (e.g., household chores) is equivalent to about 2,000 steps/day. Therefore, the recommended total daily amount is approximately 6,000 steps.
- Multicomponent exercises include activities that combine various forms of exercise, like aerobic exercises, strength training, and balance exercises. These exercises are similar to circuit training. They also include exercises with diverse movements such as gymnastics, dance, radio calisthenics, and yoga.
- Please see "Strength Training" for more information on strength training.
- Sedentary behaviour refers to all waking activities performed in a seated or reclined/lying position with an energy expenditure of 1.5 METs or less. Examples include desk work, watching TV, or using a smartphone in a seated or reclined/lying position.

2 Scientific rationale

- In the "Physical Activity Reference for Health Promotion 2013," which was developed based on a review of cohort studies targeting older adults [1], the recommendation was for older adults to engage in 10 MET-hours/week of physical activity, regardless of intensity. However, an umbrella review conducted for the formulation of the current guidelines [2] found that older adults who engage in physical activity at an intensity of 3 METs or more for 15 MET-hours/week have approximately a 30% lower risk of all-cause and cardiovascular disease mortality compared to those who engage very little in physical activity. Considering the current level of physical activity among older adults, the recommended value has been adjusted to 15 MET-hours/week.
- Even engaging in a small amount of physical activity that does not meet the recommended 15 MET-hours/week can reduce mortality rates compared to those who engage very little in physical activity. It is also a fact that individuals with lower levels of physical activity can experience significant health benefits from even a small increase in physical activity.
- Umbrella reviews on physical activity and cognitive function [3,4] have confirmed that aerobic physical activity may help prevent cognitive decline.
- It is also possible to achieve further health benefits if physical activity engagement exceeds the recommended values. Physically fit older adults may want to aim for the same recommended amount for adults, which is 23 MET-hours/week. Although the threshold for "overdoing" physical activity is not yet clear, it is important to be cautious about injuries and health conditions and to avoid overexertion.
- Multicomponent exercise can help reduce falls and fractures and maintain and improve physical function. Exercise programs focused on multicomponent exercise have been



Each paper is a systematic review, and the integrated results of the meta-analysis performed for each paper are plotted

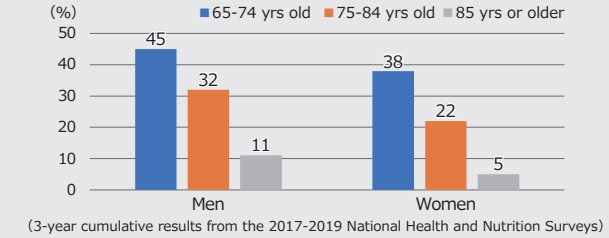
Fig. 1 Physical activity level in older adults with all-cause mortality and cardiovascular mortality [2]

shown to reduce the risk of falls by a range of 12–32% and the risk of fall-related fractures by a range of 15–66% [3,4]. Among the randomized controlled trials providing related scientific evidence, most exercise programs were implemented 3 times/week.

- According to a meta-analysis of 34 cohort studies examining the relationship between sedentary time and mortality risk [5], increased sedentary time is associated with increased mortality risk. However, engaging in moderate-to-vigorous physical activity for 60 minutes or more/day can mitigate the mortality risk associated with sedentary behaviour [6]. Additionally, frequently interrupting long periods of sedentary behaviour (e.g., every 30 minutes) is important for reducing cardiovascular and metabolic disease risks (e.g., postprandial blood glucose levels, triglycerides, and insulin resistance) [7]. It is also reported that even minor physical movements can positively impact health [8]. Thus, the recommendation is to avoid prolonged periods of inactivity and engage in small physical movements whenever possible. This recommendation is applicable even to those with difficulty standing.

3 Current status

- If we consider 6,000 steps/day to be equivalent to 15 MET-hours/week, the proportions of older adults meeting this target for the years 2017–2019—based on 2017–2019 National Health and Nutrition Surveys—by age group were as described herein: for men, 45% of those aged 65–74 years, 32% of those aged 75–84 years, and 11% of those aged 85 years and older; for women, the percentages were 38%, 22%, and 5%, respectively (Figure 2).



(3-year cumulative results from the 2017-2019 National Health and Nutrition Surveys)

Fig. 2 Percentage of older adults walking 6,000 steps or more per day by gender and age group

4 What must be worked on?

- Since it may be difficult for the public to understand what the recommendation of "15 MET-hours/week of physical activity at an intensity of 3 METs or more" actually means, the recommendation should be reframed as follows: "40 minutes or more of physical activity/day" or "6,000 steps/day." These recommended goals can be achieved not only through exercise but also by increasing daily activities. Going out, participating in social activities, and working are good opportunities to increase physical activity.
- Engage in various exercises, including aerobic exercise, strength training, and balance exercises.
- More efforts are needed to increase opportunities for older adults to go out and participate in social activities.

5 Frequently asked questions and answers (Q&A)

Q: What sort of exercises are suited for older adults?

A: While aerobic physical activities (e.g., walking) have been emphasized so far, exercises involving diverse and complex movements also contribute to health among older adults. For example, exercises that can enhance multiple physical fitness components such as strength, balance, and flexibility (i.e., multi-component exercises) are beneficial. These include exercise programs that combine aerobic exercise, strength training, and balance exercises, as well as physical activities that require engagement in various movements, like gymnastics, dance, and "radio calisthenics" . The WHO guidelines recommend multi-component exercise performance at least 3 days/week.

Q: Forty minutes/day is not enough for me. Can I engage in more physical activities?

A: Older adults with sufficient physical fitness may aim for at least 23 MET-hours/week (equivalent to at least 60 minutes of physical activity/day or over 8,000 steps/day), similar to the recommendations for adults. Importantly, engaging in physical activity beyond these recommendations can further reduce mortality rates. While evidence on what constitutes "overexertion" remains limited, it is crucial for older adults, especially those at risk of orthopedic issues, falls, or chronic condition worsening, to determine an appropriate amount of activity based on their age and health status.

Q: I don't think I can walk 6,000 steps daily.

A: Even if you cannot walk 6,000 steps a day, engaging in any amount of physical activity is beneficial for health [2,3]. Start by aiming to add just 10 more minutes of physical activity each day, and to reduce sedentary behaviour (i.e., activities at an intensity below 1.5 METs). Some activities that can naturally reduce sedentary time if practiced more often include low-intensity activities (i.e., at an intensity range of 1.6–2.9 METs) [9] such as housework (e.g., cleaning, cooking, laundry) and going out.

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4. Reference Information on Physical activity

INFORMATION 1

STRENGTH TRAINING

POINTS

- Strength training (muscle training) includes weight training (e.g., using machines) and body weight exercises (e.g., push-ups).
- Adults and older adults to engage in strength training 2–3 times/week.
- Performing strength training reportedly contributes to maintaining and improving functional ability, disease prevention, and mortality risk reduction.
- The combination of strength training and aerobic physical activities can further enhance the health benefits associated with engagement in these activities.

1 Points and description of specific examples

- Strength training (muscle training) involves exercises designed to improve muscle strength through resistance. This includes bodyweight training (e.g., push-ups and squats), where your own body weight provides the resistance, and weight training (e.g., exercises using machines or dumbbells), where external weights are used as resistance.
- Instead of focusing on specific body parts, perform strength training exercises that target major muscle groups, such as the chest, back, arms, abdomen, buttocks, and legs. By applying sufficient resistance to the muscles, they will respond by adapting to the imposed resistance and strengthening.
- It is important to perform strength training with a load that exceeds everyday activity levels and to gradually increase resistance. This is called the "principle of progressive overload," and resistance can be adjusted by weight, repetitions, and sets. It is equally critical to allow sufficient time for muscle recovery, which can be done by engaging in rest days.
- Muscles can be trained regardless of age. It is particularly crucial for older adults, who are more prone to muscle loss, to focus on maintaining and improving muscle strength.

2 Scientific rationale

Rationale for recommending strength training

- A review, primarily based on intervention studies, conducted for the development of international physical activity guidelines shows that strength training improves muscle strength, physical function, and bone density, as well as reducing the fall and fracture risk in older adults [1,2]. Additionally, systematic reviews and meta-analyses of cohort studies involving individuals aged 18–98 found that those who engage in strength training (vs. those who do not) have a 10–17% lower risk of all-cause mortality (Figure 1), cardiovascular diseases, all cancers, diabetes, and lung cancer. This risk reduction occurs regardless of aerobic physical activity level [3].
- Furthermore, research investigating the impact of strength training duration describes that even a small amount of strength training (vs. no participation at all) is associated with lower risks of all-cause mortality, cardiovascular diseases (Figure 2), all cancers, and diabetes [3]. This suggests that engaging in strength training can reduce musculoskeletal disorders, along with the risk of lifestyle-related disease onset and mortality.

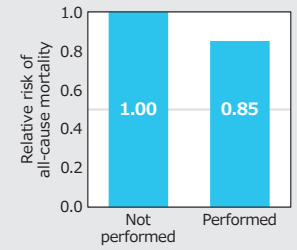

Fig. 1 Strength training and all-cause mortality [3]

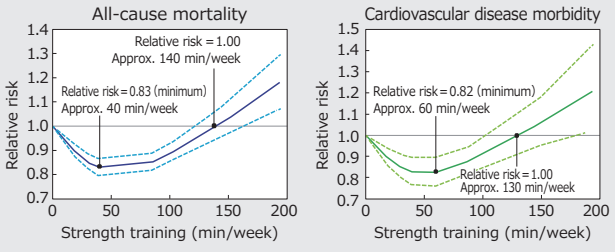

Fig. 2 Strength training, all-cause mortality, and morbidity [3]

Rationale for recommending a frequency of 2 to 3 times/week

- The above mentioned reviews [1,2] confirmed the health benefits of strength training for the musculoskeletal system, and the reported intervention studies typically employed exercise 2 to 3 times/week. Therefore, engagement in strength training 2 to 3 times/week is expected to potentially yield similar health benefits.
- Reports on disease incidence and mortality risk [3] indicate that even a small amount of exercise can be beneficial for health, albeit excessive weekly exercise time may have adverse effects (Figure 2). Therefore, considering the importance of adequate rest, the recommendation for strength training frequency is "2 to 3 days/week" accompanied by rest days between strength training.
- It is important to highlight that this recommendation is merely a guide to indicate a general direction for strength training frequency aimed at health improvements. Since individual health conditions vary, the implementation and recommendation of strength training for health purposes should be tailored to each individual.

Rationale for the combined effect of aerobic physical activity and strength training

- In the abovementioned meta-analysis [3], groups that engaged in both aerobic physical activity and strength training had lower risk of all-cause mortality (Figure 3), cardiovascular disease mortality, and cancer mortality compared to those who did not engage in either type of physical activity. Furthermore, the groups that engaged in both aerobic physical activity and strength training exhibited lower health risks compared to those who engaged in only one type of physical activity. A possible conclusion here is that combining both aerobic physical activity and strength training can provide even greater health benefits.

Fig. 3 Combination of strength training and aerobic physical activity on all-cause mortality [3]

3 Current status

- In Japan, the percentage of people engaging in strength training ranges from 9–29% [4], with the highest percentage among age groups being observed in individuals aged 18–19 years (29%), and the proportion decreasing as age increases (Figure 4).
- According to the 2016 Social Life Basic Survey, the percentage of people who engage in "equipment-based training" is 15%, making this type of training second only to "walking and light calisthenics" [5].
- When considering all physical activities that contribute to muscle strength improvements, including strength training, the proportion of people who engage in such activities at least twice a week ranges from 14–74%, and the percentage is notably lower among older adults [6].

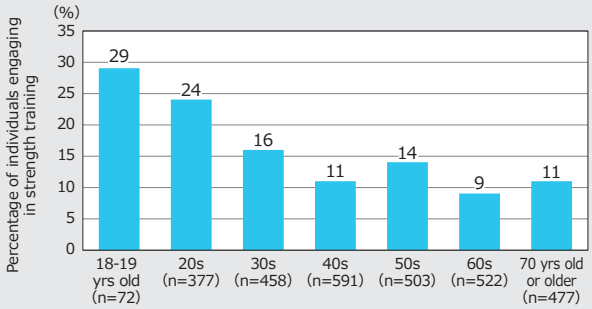

Fig. 4 Percentage of individuals in Japan engaging in strength training [4]

4 What must be worked on?

- The implementation rate of strength training tends to be lower among older adults (Figure 4) and women, the groups that are particularly susceptible to Locomotive Syndrome, frailty, and osteoporosis. This makes it critical to actively promote strength training, which can help maintain and improve muscle strength, physical function, and bone density, for these groups.
- To encourage the continued practice of strength training, it may be helpful to start by educating individuals about the health benefits and basic methods of strength training. Since muscle strengthening often leads to noticeable improvements, providing effective feedback can help build trainees' confidence.
- When engaging in strength training, it is important to apply the "principle of individualization," tailoring the exercises to one's characteristics and abilities. In group settings, such as exercise classes, it is advisable to avoid uniform goals and instead set personalized goals.
- The recommendation for engagement in strength training targets the maintenance and enhancement of musculoskeletal function, along with the prevention of diseases and reduction of mortality rates. It is crucial for municipalities and exercise instructors to actively disseminate this information about the reasons underlying the promotion of strength training.

5 Frequently asked questions and answers (Q&A)

Q: Specifically, how should I engage in strength training?

A: As a reference example, the Ministry of Health, Labour, and Welfare has published a "Standard Exercise Program." For instance, to effectively work all major muscle groups when using machines, it is recommended to use weights that are 60–80% of your maximum lifting capacity and to perform 8–12 repetitions for each muscle group exercise. Exercises should follow these standards while being tailored to individual needs. If needed, consult with a professional exercise instructor to design a strength training program that suits your condition. When doing home exercises, the simplest guideline is to "perform the exercise until you can no longer do so" without overexerting yourself. Additionally, be cautious not to hold your breath to prevent sudden spikes in blood pressure.

Q: Will following the recommendations for strength training make me muscular?

A: The recommendations are guidelines aimed at maintaining and enhancing health over the long term. Therefore, if your goal is to improve athletic performance, bodybuilding, or changing your physique, you should follow a strength training program tailored to your specific objectives.

Q: How likely is it to get injured from strength training?

A: There is not enough scientific evidence regarding injury risk associated with this activity. However, a report summarizing 121 studies involving strength training for individuals aged 60 years and above found that 43 of these studies (36%) reported some type of adverse event [7]. The analysis behind this percentage included all adverse events that occurred during the intervention period, including minor ones, and does not necessarily indicate that strength training was the direct cause. Regardless, it is important to be cautious about injury risks, avoid pushing yourself too hard, and perform exercises within your capacity.

Q: Does more strength training lead to greater health benefits?

A: Excessive strength training might actually reduce health benefits (Figure 2), although the available evidence on the topic remains insufficient and further research is needed. Additionally, there is not yet enough evidence regarding the health benefits of strength training based on different parameters, such as intensity and number of repetitions.

[References]
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INFORMATION 2

TIPS FOR ACTIVE LIVING AT THE WORKPLACE

POINTS

- Working adults tend to have less pronounced exercise habits, and those in occupations that involve prolonged sitting (e.g., office workers) are more likely to have lower step counts and physical activity levels.
- A lack of physical activity and prolonged sitting behaviour can increase health risks such as type 2 diabetes and musculoskeletal disorders, as well as lead to low back pain, shoulder stiffness, and headaches. These problems can potentially affect productivity.
- Initiatives that enable workers to be more active in the workplace are crucial for protecting workers' health and enhancing productivity.
- This section introduces theoretical models and research examples that could be useful for the implementation of measures to support workers who spend many hours sitting to stay active.

1 Socioecological model

- To stay active at work, it is crucial for individuals to recognize the importance of staying active and enthusiastically engage in related processes. However, it may be challenging for workers to emphasize being active during work (rather than just during their leisure time) if they have to rely exclusively on individual effort. For example, in work environments where long periods of sitting are enforced, if there is no shared understanding of the value of staying active in the workplace, colleagues might misinterpret the worker's behaviour as "slacking off." This showcases the potential challenges associated with an exclusive reliance on personal effort for to maintain an active lifestyle in the workplace.
- In recent years, Socioecological models, like the one shown in Figure 1, have garnered attention, demonstrating that the factors influencing human behaviours are multi-layered [1]. In other words, rather than implementing measures only at the individual level, stakeholders can incorporate procedures at the organizational, community, and policy levels to enhance the overall impact of the strategy on the entire group.

Based on Reference 1, this figure was created by the research team for the 2022 Ministry of Health, Labour and Welfare Science Research Grant for "Elucidating the Causes Affecting the Practice of Physical Activity and Exercise for Health Promotion and Promoting Countermeasures Based on Scientific Evidence."

Fig. 1 Socioecological model (partially amended) [1]

2 Model encouraging behavioural changes

- Using multi-layered measures, what specific actions should be taken to promote an active lifestyle at work? One of the theories in human behavioural science is the COM-B model [2], positing that behaviour results from the combined effect of capability, opportunity, and motivation (Figure 2).
- Regarding capability, there are physical and psychological aspects; physical capability can be enhanced through training, while psychological capability can be improved by education (i.e., providing knowledge and understanding).
- Regarding opportunity, it includes both physical and socio-cultural aspects, and environmental changes are necessary for improving both aspects.
- Regarding motivation, it can be intrinsic or extrinsic. To enhance intrinsic motivation toward a behaviour, a positive view must be fostered, which can be achieved by increasing knowledge and understanding about the behaviour. Extrinsic motivation can be increased through incentives and environmental changes.

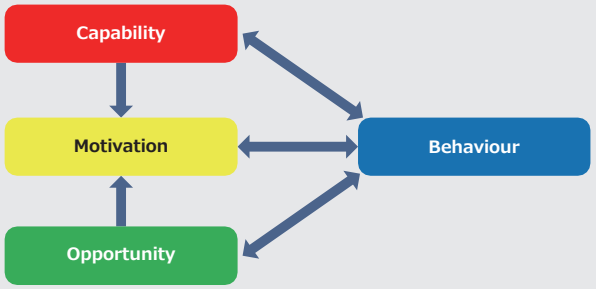
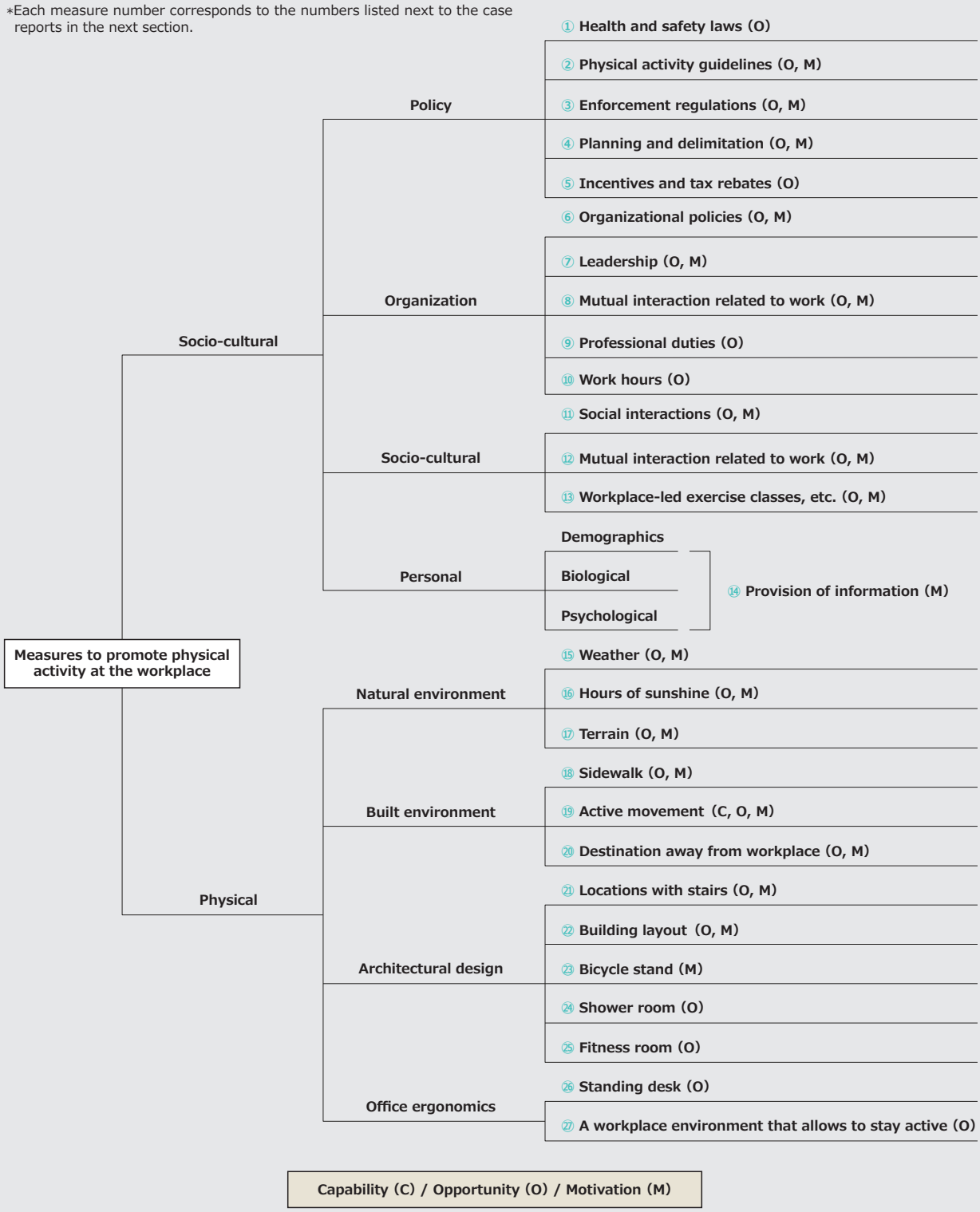


Fig. 2 COM-B model [2]

3 Specific measures

- The combination of the social-ecological and COM-B models offers the opportunity to implement specific measures (summarized in Figure 3) that support staying active in the workplace [3]. However, while these measures provide an appropriate conceptual framework, some examples may have low feasibility when considering cost and other factors. Accordingly, in making decisions about initiative application, stakeholders should consider cost-effectiveness while keeping the measures in Figure 3 in mind.



*Based on Reference 3, this figure was created by the research team for the 2022 Ministry of Health, Labour and Welfare Science Research Grant for "Elucidating the Causes Affecting the Practice of Physical Activity and Exercise for Health Promotion and Promoting Countermeasures Based on Scientific Evidence."

Fig. 3 Specific measures that combine the Socioecological model and the COM-B model [3]

4 Case reports

- Based on the theoretical background provided above, some examples of specific workplace initiatives are presented herein.

* Numbers within round brackets correspond to the measures listed in Figure 3 above.

Case 1

Improving high-density lipoprotein cholesterol through physical activity promotion in factories (⑬⑭)

- In a study involving 2,929 workers at 10 Japanese factories, 5 factories implemented interventions for workers that included information provision about physical activity, campaign implementation, and walking tools provision. The other 5 factories, serving as the control group, only provided educational materials to individuals. Results showed that, over 4 years, high-density lipoprotein cholesterol increased by 2.7 mg/dL (+4.8%) in the intervention group but decreased by 0.6 mg/dL (-1.0%) in the control group, demonstrating the effectiveness of the intervention [4].

Case 2

Weight loss effects from workplace metabolic syndrome prevention guidance (⑬⑭)

- A recent study recruited 101 Japanese workers at risk of metabolic syndrome, including high blood glucose, high blood pressure, and dyslipidemia. The intervention group received assessments, goal setting interventions, monthly advice on diet and physical activity from dietitians and exercise instructors and had access to a website for diet and step self-monitoring. The control group did not receive these services. After 4 months of intervention, the intervention group showed significant improvements in weight, body mass index, fasting plasma glucose, insulin and homeostasis model assessment of insulin resistance [5].

Case 3

Improvement in sleep quality through a walking intervention at the workplace (⑬⑭)

- In a study involving 490 Japanese workers, a walking intervention targeting 10,000 steps/day was implemented. Although there was no control group, the study found that sleep quality improved after 4 weeks of walking intervention. Notably, the walking intervention led to a more significant improvement in sleep quality in the group with no prior exercise habits [6].

Case 4

Exercise guidance during lunch breaks at work (⑬⑭)

- In a study involving 59 workers at 11 workplaces in Japan, a workplace intervention, comprising exercise sessions conducted 3 times a week during lunch breaks, was implemented. Compared to a group instructed to maintain their usual daily activities without exercise guidance, the group receiving the workplace intervention showed improvements over 10 weeks in vitality, interpersonal stress, social support, and job satisfaction [7].

Case 5

Multi-faceted intervention including workplace environment changes (⑥⑬⑭㉓㉔㉕)

- In a study involving 208 workers at eight workplaces in Japan, a multi-faceted intervention including environmental improvements was implemented. Compared to the control group that received only feedback and standard occupational health services, the group undergoing the multi-faceted intervention showed an increase in physical activity after 3 months. However, the intervention was effective only in large and medium-sized workplaces, and not in small workplaces [8].

Case 6

Impact of high-intensity interval training at the workplace (⑬⑭)

- A research study sampled 32 Japanese workers and divided them into 2 groups, as follows: 1 group underwent 8 weeks of high-intensity interval training followed by 3 weeks of dietary restriction; the other group underwent 3 weeks of dietary restriction followed by 8 weeks of high-intensity interval training. After 11 weeks, both groups showed improvements in body composition, metabolic syndrome risk factors, and cardiorespiratory fitness [9].

Case 7

Potential effectiveness of a multi-faceted intervention for older adult workers (①⑪⑬⑭)

- A study involving 69 older adult workers at an Older Adults Human Resource Center examined the effects of a multi-faceted intervention comprising exercise, nutrition, and social programs. The findings suggest that this multi-faceted intervention could be an effective strategy for reducing risk factors related to falls (e.g., muscle strength, agility, and balance) among older adult workers [10].

Case 8

Feasibility of a comprehensive and multi-faceted program to promote physical activity in office workers (⑦⑪⑬⑭㉒)

- A study implemented an 8-week, comprehensive, multi-faceted physical activity promotion program among 76 office workers aged 20 years and over. An analysis of 50 participants showed significant increases in daily moderate-to-vigorous physical activity by 7.3 min and steps by 873 steps after the intervention. Among 40 participants, an additional analysis was conducted to compare workdays with weekends; the results showed significant increases in daily moderate-to-vigorous physical activity by 10 min and steps by 1,172 steps on workdays and in steps by 1,310 steps on weekends. Using data from 34 participants to compare office workdays with remote workdays, moderate-to-vigorous physical activity was shown to increase by 7.1 min and steps by 826 steps on remote workdays [11].

Case 9

Impact of eliminating excessive sitting by office environment improvement (㉒㉖㉗)

- In a research study evaluating the effects of office environment improvements on reducing sedentary behaviour, the scientists used video recordings from fixed cameras and advanced image analysis technology with deep learning to examine changes in space utilization [12]. The results indicated that, compared to the control group (29 participants), sedentary behaviour decreased by 40 min/day in the renovation group (13 participants). Additionally, low-intensity physical activities (e.g., standing and walking) increased by 24 min/day (Figure 4, left). Artificial intelligence image analysis revealed that, after the renovation, there was increased use of circulation pathways, and the newly added shared seating areas were more frequently used near entrances and windows (Figure 4, right). Furthermore, office relocations with similar environmental improvements were associated with the maintenance and improvement of waist circumference, high-density lipoprotein cholesterol, and hemoglobin A1c levels [13].

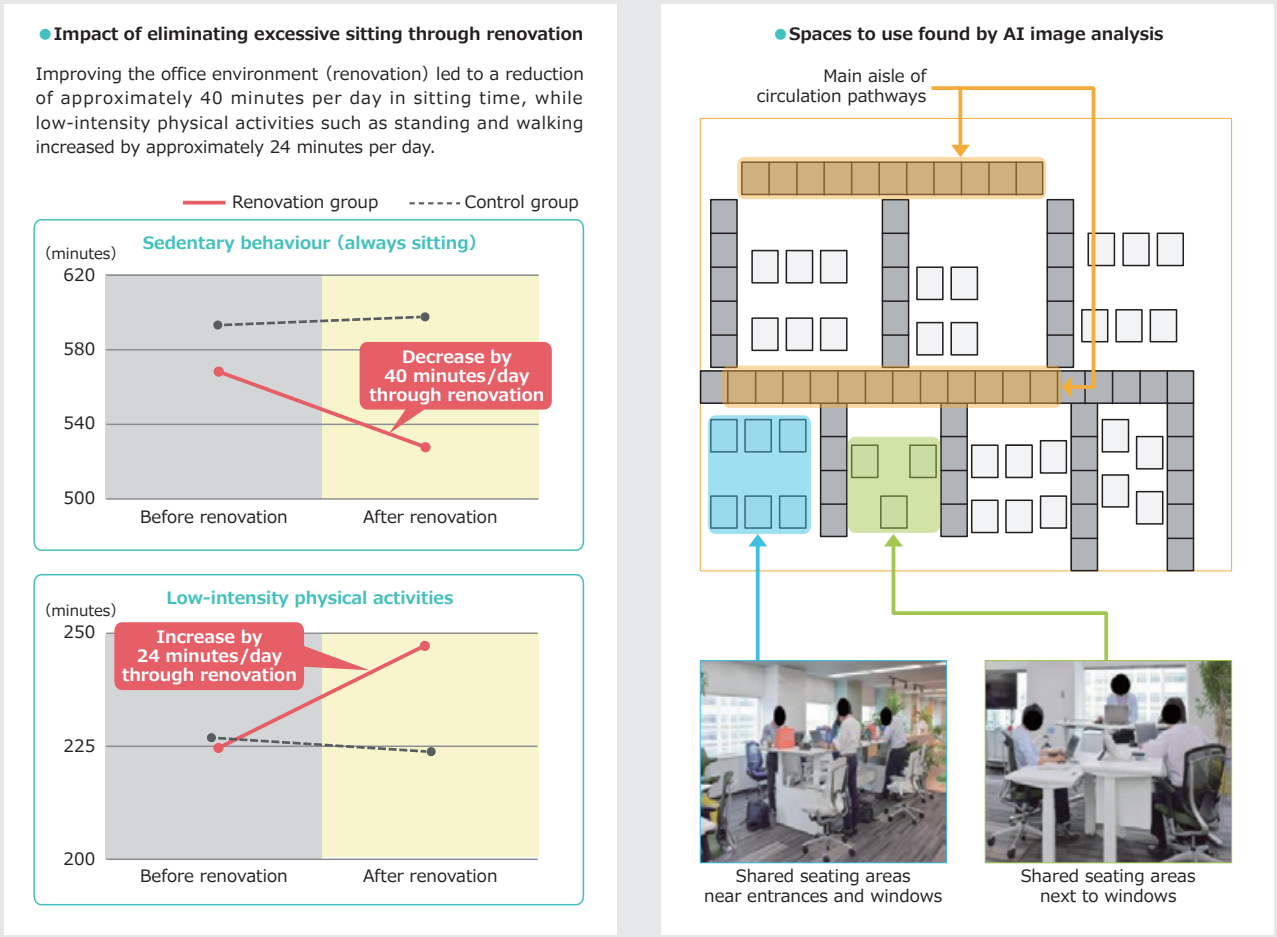


Fig. 4 Impact of eliminating excessive sitting by improvement of the office environment [12)]

5 Conclusions

- Research in workers suggests that higher levels of physical activity are associated with lower risks of cardiovascular diseases and better health indicators, such as reduced depression. Meanwhile, higher amounts of sedentary behaviour during work are linked to increased health risks. Generally, various physical activity interventions in the workplace implemented thus far show favorable effects on health indicators. It is anticipated that research evidence accumulation will bring clarity to key issues in this field and lead to the development of standardized intervention programs.

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INFORMATION 3

PHYSICAL ACTIVITY TIPS FOR INDIVIDUALS WITH CHRONIC DISEASES
(HYPERTENSION, TYPE 2 DIABETES, DYSLIPIDEMIA, AND KNEE OSTEOARTHRITIS)

POINTS

- Target audience: physicians and individuals in a position to recommend or guide exercise interventions and physical activity for patients and health check-up recipients.
- The recommendation is for physical activity to be tailored to the individual's condition, even among individuals with chronic diseases. This guide specifically targets individuals with hypertension, type 2 diabetes, dyslipidemia, and knee osteoarthritis—provided that their condition is stable. It is important for these individuals to first assess their current condition before engaging in physical activity. They should start with manageable intensities and frequencies that gradually increase over time.
- Since physical activity can exacerbate certain complications and musculoskeletal pain/deformities, consultation with a physician or other specialist beforehand is recommended.
- Even individuals with chronic diseases whose conditions do not restrict physical activity should aim to engage in physical activity at an intensity of 3 METs or higher for at least 23 METs·hour/week. They should engage in activities with an equivalent or greater intensity than walking for at least 60 min daily (i.e., approximately 8,000 steps/day). Older adults or those with lower fitness levels, are recommended to engage in physical activity for at least 40 min daily (i.e., equivalent to approximately 6,000 steps/day).
- Engage in strength training 2–3 times/ week.
- Older adults should engage in multicomponent exercises that account for strength, balance, and flexibility at least 3 days/week.
- Avoid excessive sedentary behaviour (e.g., sitting for long periods).
- Medical and health checkup institutions should disseminate messages promoting physical activity tailored to the individual's readiness and condition.

1 Recommendations and description of specific examples

- Recommendations for adults and older adults can be applied. However, for individuals with chronic diseases, it is more practical to choose activities based on their health condition, prior physical activity levels, and fitness level rather than their age. Evidence suggests engaging in at least 30 min of moderate-intensity physical activity daily, which is equivalent to leisure time physical activity (LTPA) that encompasses easy to somewhat strenuous tasks. To improve chronic conditions, it is recommended to combine 30 min of LTPA (30 min of intentional body movement) with 30 min of other daily activities, totaling 60 min (approximately 8,000 steps) per day, aligning with the recommendations for adults.
- Typically, strength training should be performed 2 to 3 days a week. For older adults, multi-component exercises should be performed accounting for strength, balance, and flexibility exercises.
- In cases of individuals with type 2 diabetes, improving insulin resistance requires ensuring no more than 2 consecutive days without exercise.
- For individuals with hypertension, daily exercise is recommended, as its acute benefits (i.e., immediate effects) typically last 1 day. The intensity should start at the level of regular daily activities.
- Since physical activity levels vary between individuals, it is important to assess each person's situation and start at a manageable intensity, duration, and frequency. For those with currently low activity levels or for older adults, it is advisable to start at a manageable intensity and aim for a total of 40 min/day, in line with the recommendations for older adults.

2 Scientific rationale

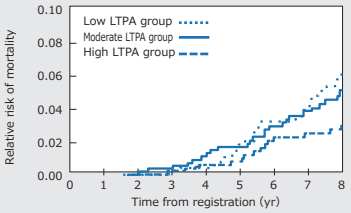
- In developing this guide, we focused on chronic diseases that are particularly prevalent and for which exercise is effective, namely hypertension, type 2 diabetes, dyslipidemia, and knee osteoarthritis (Table 1).
- For individuals with these chronic diseases, regular physical activity improves the quality of life and reduces the risk of developing new conditions[1-3]. This occurs through the maintenance of and improvements in insulin resistance, cognitive function, immune function, and physical function (refer to "Mechanisms for the Prevention and Improvement of Diseases through Physical Activity"). In particular, regular physical activity aids in maintaining and improving not only blood pressure, blood glucose, and lipid control, but also physical function and quality of life, thereby extending individuals' healthy life expectancy. For example, in the Japan Diabetes Complications Study comprising patients with type 2 diabetes (Figure 1), those in the maximum LTPA group exhibited significantly lower risks of stroke and all-

Table 1. Summary of knowledge on physical activity promotion for individuals with chronic diseases as reviewed when preparing this guide

Disease	Evidence	Recommendations		Important points
		Overall	Special remarks for each disease	
Hypertension	• The evidence strongly suggests that physical activity improves hypertension. • Moderate evidence supports the effectiveness of exercise in preventing cardiovascular diseases and improving physical function and health-related quality of life.	• At least 150 min/week (more than 30 min daily) of regular moderate-intensity physical activity. • Perform strength training 2 to 3 days/week. • Start at low and gradually increase the exercise intensity based on fitness level and health condition.	Vigorous-intensity and high-frequency exercise may increase the risk of hemorrhagic stroke. Therefore, it is essential to be cautious and avoid exceeding the recommended levels.	• If blood pressure is 180/110 mmHg or higher (with home blood pressure readings of 160/100 mmHg or higher), prioritize controlling blood pressure. • For individuals with a history of cerebrovascular or cardiovascular disease, assess the safety of exercise beforehand. • Note that, antihypertensive medications (e.g., β -blockers) may make it harder for the heart rate to rise during exercise.
Type 2 diabetes	• There is strong evidence of exercise therapy—including aerobic physical activity, strength training, and their combination—improving blood glucose control and cardiovascular disease risk factors. • Improvements in physical function and quality of life can be expected.		• Non-engagement in physical activity and exercise should not exceed 2 consecutive days. • Strength training should be performed 2 or 3 days/ week on non-consecutive days, and both physical activity and strength training should be included if not contraindicated. • Avoid prolonged sedentary behaviour by incorporating light activities between extended periods of inactivity.	• Determine the presence of hypoglycemia and any complications in advance. • In general, cardiovascular disease screening is unnecessary in asymptomatic individuals engaging in light to moderate exercise (e.g., brisk walking or daily life activities).
Dyslipidemia	Regular moderate-intensity aerobic physical activity for at least 150 min/week improves dyslipidemia.		It is unclear whether strength training improves dyslipidemia; however, it is expected to help maintain and enhance muscle strength, physical function, and daily life functions.	Patients undergoing dyslipidemia treatments (statins), may experience muscle weakness and pain.
Osteoarthritis	• The evidence strongly suggests that physical activity relieves pain and improves physical function. • There is moderate evidence supporting an improvement in the health-related quality of life and the suppression of disease progression.		• Aerobic exercise (both land- and water-based), strength training, flexibility exercises, and mind–body exercises (such as Tai Chi, yoga, and breathing exercises) relieve pain and improve physical function. • Engaging in supervised exercise more than thrice a week is effective in reducing pain. A useful recommendation is to participate in a total of 24 sessions over 8–12 weeks.	Evaluate individuals who experience worsening pain with exercise, have severe deformities, or exhibit instability during walking or daily living activities.

cause mortality than those in the minimum LTPA group[4]. The maximum LTPA group had a lower limit of 15.4 METs·hour/week, roughly corresponding to 30 min of moderate-intensity activity per day, with the group's average (36.8 METs·hour/week) equivalent to over 60 min of moderate-intensity activity per day.

- It is important to adjust the physical activity levels according to the individual's condition. For individuals with chronic diseases, the recommendations for adults and older adults can be followed, which align with previous guidelines that suggest 30 min of physical activity per day.



Low LTPA group ≤ 3.7 MET-hours/week (mean ± SD: 0.8 ± 1.1 MET- hours/ week); Moderate LTPA group 3.8–15.3 MET-hours/ week (9.1 ± 3.8 MET-hours/week); High LTPA group ≥ 15.4 MET-hours/week (36.8 ± 24.4).

[Participant and Methods]
Followed 1,702 individuals with type 2 diabetes (mean age 58.5 years, 47% women) from 59 facilities for a median of 8.05 years. A standardized questionnaire was used to evaluate LTPA and occupation as part of a comprehensive lifestyle assessment.

Fig. 1 All-cause mortality and leisure time physical activity[4]

3 Current status

How many people are there with chronic diseases?

- In Japan, more than 60% of people aged 60 years and above receive treatment for some form of illness, with this proportion increasing with age[5]. Specifically, there are 43 million people with hypertension, approximately one-third of whom are untreated and unaware of their high blood pressure status[6]. The combined number of people with diabetes and pre-diabetes is approximately 20 million[7]. Furthermore, 2,205,000 patients are currently receiving treatment for dyslipidemia[8]. Regarding chronic knee osteoarthritis, radiographical examinations show deformities in 20–25 million people, with an estimated 8 million experiencing symptoms such as pain[9, 10].

What is the percentage of individuals with chronic diseases who engage in exercise and/or physical activity?

- The proportion of individuals with metabolic syndrome or pre-metabolic syndrome who engage in regular physical activity is lower than that of individuals without these conditions[11]. Regarding osteoarthritis, a meta-analysis revealed that less than 20% of individuals met the recommended amount of physical activity[12]. Similarly, domestic surveys in Japan indicated that people with knee pain are less likely to engage in 150 min or more of physical activity per week compared to those without knee pain (35.6% vs. 51.2%, respectively)[13].

Which individuals with chronic diseases were physically inactive?

- Among individuals with hypertension, those without a regular physical activity habit are often unaware of their own blood pressure readings; the level of interest in health and disease correlates with the presence of a physical activity habit[14]. Furthermore, individuals who do not receive regular physical activity guidance from physicians or physical activity instructors at the time of their visit tend to show insufficient levels physical activity and exercise engagement[15].

4 What must be worked on?

- It is assumed that individuals with chronic diseases undertake regular health checkups, medical visits, and necessary treatments. If physical activity is not contraindicated, these individuals, particularly those with low activity levels, should be encouraged to increase their activity, even slightly, under medical supervision.
- Since exercise can affect disease management, regular health checkups and information sharing are necessary.
- For individuals with chronic diseases exercising at a facility, if either the professionals or the patient suspects a new health issue, the patient should be referred to a medical institution. Even then, it is generally possible for such individuals to engage in daily physical activity. Therefore, patients are encouraged to continue performing daily activities and to schedule a medical checkup.
- If the individual is sedentary for prolonged periods, replacing this behaviour —such as taking short breaks every 30 min to move—can also be effective.

5 Frequently asked questions and answers (Q&A)

Q: Can this guide also be used for exercise therapy?

A: This guide is useful for understanding the basic principles and general guidelines of engagement in physical activity and exercise for individuals with chronic diseases. However, to determine the most effective and efficient methods tailored to individual situations, more detailed exercise prescriptions are required. Therefore, it is recommended to consult with a sports medicine specialist or specialized exercise facilities (such as designated exercise therapy facilities*1 or medical facilities under Article 42 of the Medical Care Act*2) according to individual circumstances.

Q: Please provide information on exercise therapy instructors and facilities suitable for individuals with chronic diseases.

A: The designated facilities and medical facilities under Article 42 of the Medical Care Act are relevant. For broader exercises aimed at promoting vitality and health, various other facilities are available. It is recommended to consult with your primary care physician or a local sports medicine specialist.

*1 Designated Exercise Therapy Facility: these are health promotion facilities certified by the Minister of Health, Labour, and Welfare for their suitability in providing exercise therapy.

*2 Facilities Under Article 42 of the Medical Care Act (Disease Prevention Exercise Facility): Article 42 recognizes "facilities that provide aerobic exercise for disease prevention" as an ancillary service operated by medical corporations. These facilities are referred to as "MCA42 Facilities" or "Article 42 Facilities."

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(Editorship: The Japanese Society of Hypertension / The Japanese Orthopaedic Association / The Japan Diabetes Society / Japan Atherosclerosis Society / Japan Society for the Study of Obesity)

INFORMATION 4

TIPS FOR SAFE ENGAGEMENT IN PHYSICAL ACTIVITY AND EXERCISE

POINTS

- Target audience: individuals in a position to recommend or guide exercise interventions and physical activity for patients and health checkup recipients.
- Below are recommendations about safety measures when starting to engage in physical activity and exercise.

Risk of adverse events related to exercise

Higher
- When engaging in vigorous-intensity exercise
- When individuals unaccustomed to engaging in regular physical activity (those who perform low levels of physical activity or low exercise intensity) suddenly engage in exercise beyond their usual level

Lower
- When engaging in low- to moderate-intensity exercise

Checkpoint

The usual level of engagement in physical activity and intensity (including exercise), desired activities including preferred intensity and type, and the current status of any relevant diseases or symptoms.

→ Pre-exercise health check-ups as necessary (medical clearance)

→ Those who can exercise will, under medical supervision:

→ Proceed with exercise gradually according to the individual's condition

*It is also necessary to provide health and safety management for fitness enthusiasts who engage in vigorous-intensity exercise without proper risk management.

1 Regular health management

- When considering safety measures during exercise, it is crucial to give due attention to regular health management. Exercise participants are recommended to fully recognize the importance of regular health management, be aware of their body's condition, undergo regular health checkups, and, if necessary, manage chronic conditions through regular visits to medical facilities. Additionally, self-management practices are essential. These include monitoring your weight, body fat percentage, blood pressure, heart rate, and body temperature.
- As an instructor, it is important not to take a participant's self-reported "no illness" at face value. They may be unaware of any underlying conditions, especially if they do not undergo regular health check-ups. When initiating exercise, participants should share their health check-up results and information on any ongoing treatments for existing conditions. This helps in understanding their health status and recommending appropriate individual-tailored exercises. It is also important to review any concerns related to family medical history that require attention.
- While appropriately implementing these safety measures, it is crucial to dispel any misconceptions that having an illness prevents individuals from joining an exercise facility or participating in regular exercise.
- When engaging in exercise for health promotion purposes, it is equally important to consider other lifestyle habits. Along with rest, eating a healthy diet, avoiding smoking, and moderating alcohol consumption are important. Particularly for people focusing on weight loss or maintenance, it is essential to focus not only on exercise but also on overall lifestyle habits, including diet. Meanwhile, for those focusing on building muscle strength, it is necessary to increase caloric and protein intake to match the increased exercise. (For more details, refer to "Physical Activity and Energy/Nutrients."). These recommendations for muscle strength are in clear contrast to those for weight loss and for individuals with obesity.
- In terms of health benefits, both exercise and an active daily life are valuable. Therefore, it is important to lead an active lifestyle and attempt to reduce prolonged periods of sedentary behaviour.
- When engaging in physical activity and exercise, it is recommended to wear appropriate clothing and shoes that ensure comfort and safety during the activity.

2 Considerations for starting a new exercise regimen

- When starting a new exercise regimen, to determine whether it is appropriate to begin exercising, it is necessary to take into consideration the following main points: (1) the presence and status of any diseases; (2) the individual's exercise preferences and the instructor's recommendations; (3) the current level of engagement in physical activity and exercise[1]. If needed, the individual should visit a medical institution for a pre-exercise health check-up to ensure that exercise can be pursued safely and comfortably.

1) Important point to consider before starting to engage in exercise STEP 1

(1) Hypertension

- Since engaging in exercise can raise blood pressure, individuals with pre-existing hypertension should proceed with special caution.
- Particularly in cases of stage Ⅲ hypertension (examination room blood pressure of 180/110 mmHg or higher, or home blood pressure of 160/100 mmHg or higher), before initiating exercise, it is necessary to control blood pressure with medication. Thus, the individual should consult a healthcare professional.

(2) Diabetes

- For individuals with diabetes, coronary artery disease may not present typical symptoms such as chest pain. This necessitates a thorough examination.
- For individuals with diabetic complications like overt nephropathy or autonomic neuropathy, even in the absence of symptoms suggestive of angina, a multi-stage exercise stress test is recommended. These individuals should consult with their primary care physician prior to engaging in a new exercise regimen.
- Additionally, for patients with proliferative retinopathy; those

with extremely poor blood glucose management, with fasting blood glucose levels above 250 mg/dL and moderate to high ketone levels in the urine; or those with advanced diabetic neuropathy or gangrene, exercise is contraindicated.
- If the individual is unsure about complication status or blood glucose management, they should consult with their primary care physician before starting exercise.

⑶ Oral medications

Diabetes treatments: Given the development of many new medications with different mechanisms of action, it is important to be aware of the individual's current medication regimen. Typically, when initiating exercise, in individuals with normal blood glucose levels, blood insulin concentrations decrease, which increases glucose release from the liver while enhancing glucose uptake in skeletal muscles. However, for those receiving treatment with insulin or insulin-releasing medications, glucose release from the liver may remain suppressed, potentially leading to a risk of hypoglycemia.

Hypertension treatments: Because some calcium channel blockers, α- blockers, and β- blockers affect heart rate, heart rate is not an indicator of exercise intensity. For this reason, the rating of perceived exertion (RPE) is used as a reference.

Diuretics: These medications make it easier for dehydration to occur. Therefore, individuals who take diuretics and are beginning a new exercise regimen should be cautious of heatstroke and orthostatic hypotension and ensure that they stay hydrated.

Anticoagulants and antiplatelet agents: These medications and supplements, which are used to "thin" the blood, can increase the risk of bleeding. Therefore, it is important to be especially cautious with exercise that involves contact or could result in bruising or falls.

Dyslipidemia treatments (statins): Muscle weakness and muscle pain can occur in patients taking these medications, so caution is necessary.

∗For older adults, the use of medications such as sleep medicines, antipsychotics, antihistamines, antihypertensives, and blood glucose-lowering drugs can increase the risk of falls, necessitating caution.

∗It is important to be aware of any non-prescription medicines, such as supplements. Proper medication adherence and thorough monitoring for side effects are essential.

∗Ensure that information on any medication changes or additions are shared effectively and not overlooked.

⑷ Orthopedic problems such as back pain, knee pain, and joint deformities that can worsen with exercise

When an individual has orthopedic issues that may worsen with exercise, the following actions are recommended:
- The individual should consult with a physician before starting any exercise regimen.
- The exercise regimen should begin with low-intensity, short-duration exercises.
- The exercises of choice should not stress the affected areas.
- Strength training and balance exercises should be incorporated.

If the individual has a primary care physician, it is also important to check with the physician regarding the status of the condition.

2) Symptoms STEP 2

- Check for the presence or matters listed on Table 1. For self-assessment, you may use the checklists used for specific health checkups and guidance[4], and the checklist shown in Figure 1, created by referring to PAR-Q+[5].

3) Classification by risk status STEP 2

- With an aging population, it is crucial to consider not only the cardiovascular risks associated with lifestyle diseases such as hypertension, type 2 diabetes, dyslipidemia, or metabolic syndrome (metabolic syndrome: https://www.e-healthnet.mhlw.go.jp/information/metabolic-summaries/m-01; see Figure 2), but also orthopedic conditions linked to physical inactivity, such as locomotive syndrome (Locomo), osteoporosis, fragility fractures, osteoarthritis, and spinal canal stenosis. These can ultimately lead to a risk of falls and bedridden states. Checking the degree of locomotive syndrome* and understanding the risk status can also be useful.

∗Please refer to the Japanese Orthopaedic Association's Official Website for Locomotive Syndrome Prevention and Awareness "Locomo ONLINE" (https://locomo-joa.jp/check/test) for how to check the degree of locomotive syndrome.

Table 1. Signs and symptoms at rest or during exercise STEP 2

- Pain or discomfort in the chest, neck, head, arms, or other areas, believed to be caused by ischemia
- Dizziness and fainting
- Orthopnea or paroxysmal nocturnal dyspnea
- Ankle swelling
- Palpitations or a facial artery pulse
- Intermittent claudication
- Heart murmurs
- Unusual fatigue or shortness of breath during normal activities

1	Has a doctor indicated that you have a "heart disease" or "hypertension"?	Yes (Heart disease/hypertension)	➡	Do you have any movement limitations?	Yes	➡	Exercise within the scope of the limitation (Go to STEP 3). If you do not know, see a doctor.
2	Do you have chronic diseases (or a history thereof) other than "heart disease" or "hypertension"?	Yes (Disease:)	➡	Do you have any movement limitations?	Yes	➡	
3	Have you had surgery in the past?	Yes (When: What:)	➡	Do you have any movement limitations?	Yes	➡	
4	What medicines do you take for chronic diseases?	Yes (Medicine:)	➡	Are there any medications you pay attention to when exercising?	Yes	➡	Exercise with caution (Go to STEP 3). If you do not know, see a doctor.
5	Do you feel any form of "chest pain" at rest, during everyday life, or while exercising?				Yes	➡	Please be examined at a medical institution. If resolved, go to STEP 3.
6	Do you lose balance due to dizziness?				Yes	➡	
	Have you lost consciousness during the past year?				Yes	➡	
7	Do you have any bone, joint, or soft tissue (muscles, ligaments, tendons) problems that might worsen with exercise (including problems that occurred during the past year)?				Yes	➡	
8	Has a doctor ever told you to "exercise under medical supervision"?				Yes	➡	

∗Go to STEP 3 if the answers to all questions are "No."

Fig. 1: Health check sheet before starting an exercise regimen (Created referring to PAR-Q+[5]) STEP 2

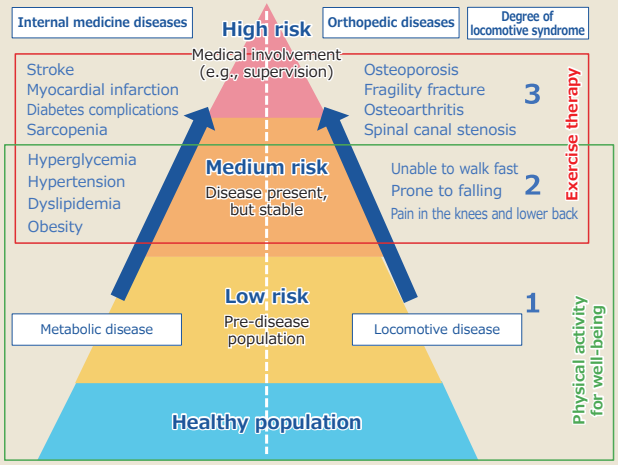

Fig. 2 Co-existence of the risk of internal medicine diseases and orthopedic diseases with aging (partially modified from Reference 7)

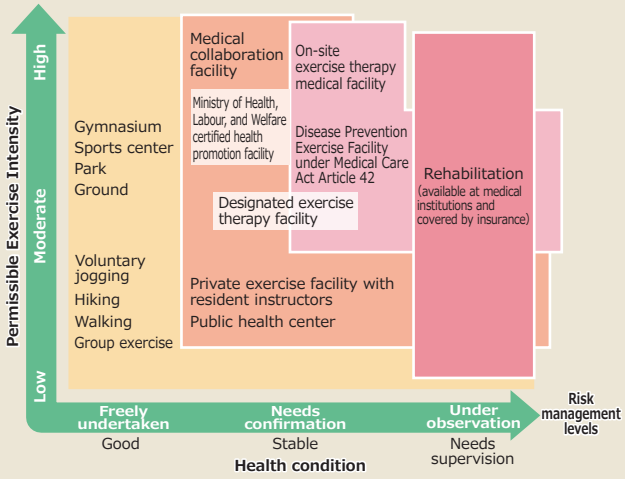

Fig. 3 Exercise environment, considering health status, permissible exercise intensity, and risk management (partially modified from Reference 8)

- Figure 3 illustrates the conceptual relationship between the health status of users and the exercise environment, based on the permissible exercise intensity[8]. Depending on the user's health status, the level of management required when engaging in exercise varies, as follows: (1) level of self-management, where exercise can be freely undertaken; (2) level requiring health guidance, where the physical condition must be confirmed; (3) level needing medical supervision, where exercise must be conducted under observation. These different health statuses also require different exercise prescriptions and amounts of monitored exercise. In practice, the roles of different facilities are not clearly separated but rather overlap with each other. When exercise intensity is very low, there are more options available for choosing where to exercise.
- For physically inactive individuals, it is important to increase activity levels gradually, even if starting with low-intensity and short-duration activities. When promoting physical activity to a whole group of people, it is crucial to create accessible spaces (e.g., setting up voluntary exercise groups in nearby locations) where everyone can easily participate in exercise at daily life-level intensity. Meanwhile, when tailoring exercise to individual needs, it is necessary to assess and verify the current health status (symptoms or existing conditions), and when necessary, consult and check with medical institutions (medical clearance) before considering supervised exercise based on specific exercise prescriptions.

4) Physical activity status STEP 3

- Regarding the assessment of the status of engagement in physical activity, questionnaires used in specific health checkups or health checkups for older adults (≥75 yr) can be used (Table 2). To track physical activity levels longitudinally and quantitatively, and to assist with subsequent exercise guidance, additional questions should be included to confirm exercise type (i.e., what type of activity), duration, frequency, and period, along with daily step count. Furthermore, it is recommended that medical institutions integrate these questions into electronic medical records in a standardized format and use them as part of the assessment of the vital signs (Physical Activity as a Vital Sign, also known as PAVS)[2,3].

Table 2. Assessment of current physical activity levels STEP 3

From a standardized questionnaire for specific health check-ups*		Response	Relevant quantitative questions
(10)	Engaging in light exercise that causes you to sweat for 30 min or more, at least 2 days a week, for over a year	(1) Yes (2) No	What ( ), ( ) min, ( ) times/week, ( ) years
(11)	Engaging in walking or an equivalent physical activity for at least 1 hour each day as part of your daily routine	(1) Yes (2) No	( ) min/day ( ) steps/day
(12)	You walk faster than someone of the same age and gender as yourself	(1) Yes (2) No	
From a questionnaire for health check-ups for older adults (≥75)*		**Response**	**Relevant quantitative questions**
(7)	Do you think your walking speed has increased compared to before?	(1) Yes (2) No	
(8)	Did you fall over the past year?	(1) Yes (2) No	( ) times/year, fractures ( ) times
(9)	Do you engage in exercise such as walking at least once per week?	(1) Yes (2) No	What ( ), ( ) min, ( ) times/week, ( ) years
(13)	Do you go outside at least once per week?	(1) Yes (2) No	( ) times/week
Examples of Physical Activity as a Vital Sign (PAVS)[3]			
(1)	On average, how many days per week do you engage in moderate- to vigorous-intensity exercise (fast walking or more)?		( ) days/week
(2)	On average, how many min of such level of exercise do you engage in?		( ) min/day
(3)	Total number of min per week ((1)×(2))		( ) min/week

*The numbers in the first column within round brackets indicate the question number in each questionnaire

3 Assessing one's health condition each time before exercise

- It is important to establish the habit of checking your health condition before each exercise session. Table 3 provides a checklist for use before you leave the house, and it serves to monitor your own condition on the day you plan to exercise. If you answer "Yes" to any of the items, do not push yourself to exercise; instead, take a rest and seek medical attention if necessary.
- For those with high blood pressure, it is recommended to not only check your own condition but also make a habit of measuring and recording your own blood pressure and pulse. Blood pressure should be measured after resting for more than five min.
- When blood pressure is excessively high, exercise can further elevate it, increasing the risk of cardiovascular events. If your blood pressure is 160/100 mmHg or higher before exercise, limit yourself to light exercises such as walking. If your blood pressure is 180/110 mmHg or higher, refrain from exercising and rest instead.

Table 3. Health condition checks before exercise

	Check items	Response	
1	I have intense leg/lower back pain	Yes	No
2	I have a fever	Yes	No
3	My body feels sluggish	Yes	No
4	I have nausea or feel ill	Yes	No
5	I have a headache or feel dizzy	Yes	No
6	My ear is ringing	Yes	No
7	I feel exhausted	Yes	No
8	I feel unwell due to lack of sleep	Yes	No

	Check items	Response	
9	I have no appetite	Yes	No
10	I feel ill from a hangover	Yes	No
11	I have diarrhea and constipation and my stomach hurts	Yes	No
12	I am experiencing shortness of breath and palpitations from light movement	Yes	No
13	I feel like I have a cold, with coughing and sputum	Yes	No
14	My chest hurts	Yes	No
15	(Summer) There is a heatstroke alert	Yes	No

4 What should be carefully considered during exercise

- If you experience any of the following symptoms during exercise or notice any unusual changes in your condition, stop exercising immediately.

  - Chest pain
  - Palpitations
  - Dizziness or vertigo
  - Intense hunger or trembling
  - Unusually intense fatigue
  - Intense joint and muscle pain
  - Cold sweats

- For individuals with obesity, be aware that exercise can lead to musculoskeletal disorders, so take extra precautions.
- Proper hydration and sodium intake are also important, so make sure to replenish fluids and sodium approximately every 15 min during exercise.
- When engaging in moderate-to-vigorous intensity exercise, it is essential to always perform a warm-up (i.e., preparatory exercise). The key purposes of a warm-up can be summarized into the following four points:

❶ Prevention of injuries and medical incidents during exercise.
❷ Improvement of exercise performance.
❸ Mental preparation for exercise.
❹ Ascertaining the participant's physical condition.

- It is also important to be mindful of the temperature (room temperature) and humidity.

5 What should be carefully considered after exercise

- Sudden cessation of exercise can lead to a rapid decrease in pulse rate and stroke volume, with the loss of muscle pump action resulting in impaired venous return. Conversely, owing to the action of vasodilators, blood vessels in the periphery, particularly in active muscles, remain dilated, leading to a sharp decrease in total peripheral resistance and consequently causing a drop in blood pressure. This can also trigger arrhythmias. Therefore, to prevent abrupt decreases in pulse rate, stroke volume, and venous return, and to avoid blood pressure drops, it is beneficial to continue with low-to-moderate intensity dynamic exercises after completing the exercise regimen.
- After performing an exercise of a certain intensity, it is necessary to engage in a cooldown exercise for about 5–10 min. The purposes of the cool-down exercise are summarized into the following 3 points[9]:

❶ Promoting fatigue recovery.
❷ Preventing dizziness or fainting immediately after exercise.
❸ Preventing chronic injuries and muscle pain.

- Whether fatigue remains the next day is an important point to consider when evaluating exercise intensity and volume. If the fatigue is such that it interferes with daily activities the following day, it indicates that the intensity or volume was excessive. It is important to rest first and then adjust by reducing the intensity or volume of exercise for future sessions.

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INFORMATION 5

MECHANISMS FOR THE PREVENTION AND CONTROL OF DISEASES THROUGH PHYSICAL ACTIVITY

POINTS

- Habitual engagement in physical activity reduces mortality and morbidity and is effective in promoting health. Understanding the underlying mechanisms can facilitate the implementation of recommendations for safer, more effective physical activities that improve health.
- In this context, we will review comprehensive studies in the physiology, biochemistry, and clinical medicine fields. By integrating knowledge about the long-term effects of physical activity and disease onset mechanisms, we aim to clarify the mechanisms through which physical activity prevents and controls the onset of diseases and other conditions.

1 Types of physical activity and exercise

- Physical activity refers to all movement involving skeletal muscle contractions that consume more energy than when at rest. Physical activity can be classified into 2 types, as follows: "lifestyle activities," including daily activities such as household chores, work, commuting, and attending school; "exercise," referring to planned or regularly performed activities to maintain and/or improve health and physical fitness. Furthermore, based on differences in the physical activity intensity, how they affect one's metabolism, and the movements involved, physical activity can be broadly categorized into 2 types: "aerobic physical activity" such as walking, which is sustained by breaking down energy substrates using oxygen; "anaerobic physical activity" such as strength training, generating significant power in a short time by breaking down energy substrates without direct use of oxygen.
- When aerobic physical activity is performed regularly for an appropriate duration, at a suitable intensity and frequency, it increases energy expenditure and reduces body fat. It also improves cardiorespiratory fitness (peak oxygen uptake) by enhancing the lungs' ability to absorb oxygen, the heart and arteries' ability to transport oxygen, and the skeletal muscles' ability to utilize oxygen. Additionally, aerobic physical activity effectively improves risk factors for lifestyle-related diseases, such as blood pressure, blood glucose levels, and blood lipid levels. The significantly lower risk of death and various diseases among those who habitually engage in aerobic physical activity and have better cardiorespiratory fitness is related to these adaptations in various organs.
- Anaerobic physical activities (e.g., strength training) generate adenosine triphosphate (also known as ATP) in a short period by breaking down creatine phosphate and glycogen stored in muscles without the need for oxygen. This activity pattern allows for the exertion of significant force over a brief duration. The regular practice of anaerobic physical activities leads to muscle hypertrophy, increased muscle strength, the enhancement of skeletal muscles' antioxidant and anti-inflammatory capacities, and the increased secretion of myokines. These improvements are believed to be associated with a reduced risk of mortality and the onset of certain diseases.

2 Types of diseases

- Diseases influenced by physical activity can be broadly categorized into five groups, as follows: 1) metabolic diseases (e.g., obesity, metabolic syndrome, type 2 diabetes, and dyslipidemia); 2) cardiovascular diseases (e.g., hypertension, ischemic heart disease, heart failure, and stroke); 3) musculoskeletal disorders (e.g., joint pain, lower back pain, osteoporosis, and sarcopenia); 4) mental and neurological disorders (e.g., depression, anxiety, stress, and dementia); and 5) certain cancers (colorectal, endometrial, and breast cancer).
- The mechanisms by which physical activity impacts the relevant body parts and organs for each of these disease groups are systematically organized below.

3 Mechanism of disease prevention and improvement by physical activity

1) Metabolic diseases

- Dysfunction in adipose tissue, skeletal muscle, and the liver are major contributing factors for metabolic diseases.
- Physical activity helps use fat stored in adipocytes, which are distributed in subcutaneous tissue, the abdomen, the liver, and skeletal muscles as an energy source, and also contributes to obesity prevention and treatment by facilitating the occurrence of a negative energy balance between energy expenditure and dietary energy intake.
- Independent of improving obesity, the muscle contractions associated with physical activity promote glucose uptake through the expression and translocation of glucose transporter type 4 to the muscle cell membrane and enhance mitochondrial respiratory metabolism, improving insulin sensitivity and helping to control blood glucose levels.
- Furthermore, adiponectin, which is secreted from adipocytes that shrink owing to physical activity, improves insulin sensitivity, thereby contributing to diabetes prevention and control.
- The muscle contraction and increased muscle blood flow associated with physical activity also increase lipoprotein lipase and lead to their enhanced activity in vascular endothelial cells, which in turn breaks down triglycerides in the blood into fatty acids and glycerol. This process facilitates their uptake into muscles and thereby contributes to dyslipidemia prevention and treatment.

2) Cardiovascular diseases

- Dysfunction in the heart, blood vessels, and autonomic nervous system are major contributing factors to cardiovascular diseases.
- Aerobic physical activity particularly induces both structural adaptations (e.g., the enlargement of the left ventricular cavity and increased capillary density in skeletal muscles) and functional adaptations (e.g., improved autonomic nervous system activity, improved arterial stiffness, lowered heart rate, and decreased peripheral vascular resistance). These changes help maintain normal blood pressure levels, thereby preventing and improving hypertension.
- Additionally, regular aerobic exercise enhances arterial endothelial function, improves coagulation and fibrinolysis regulation, and reduces plaque formation, collectively lowering the risk of thrombus formation and therefore reducing the risk of coronary artery disease and stroke

caused by arterial blockages.

3) Musculoskeletal disorders

- Deformation, atrophy, and inflammation of bones, muscles, and joints are the major contributing factors to musculoskeletal disorders.
- Physical activity helps prevent and improve conditions like lower back pain and joint pain by suppressing chronic inflammation through the production of anti-inflammatory myokines in skeletal muscles and the activation of immune cells.
- Additionally, engagement in physical activity affords physical stimuli to bones and muscles that regulate the activity of osteoblasts and osteoclasts, altering the balance between bone formation and resorption. This process, along with the promotion of protein synthesis in muscles and the enhancement of neuromuscular function, contributes to the prevention and control of osteoporosis and sarcopenia.
- Anaerobic activities are particularly effective for the control of musculoskeletal disorders. These include, for example, strength training that exerts significant force on muscles and bones. However, even aerobic physical activities have shown preventive effects against musculoskeletal disorders, especially in older adults with lower fitness levels.

4) Mental and neurological disorders

- Common occurrences associated with mental and neurological disorders include a decrease in hippocampal volume, blood concentrations of brain-derived neurotrophic factors, and neurotransmitters.
- Physical activity has been reported to increase the blood concentrations of neurotrophic factors and neurotransmitters and to suppress hippocampal atrophy in patients with depression and mild cognitive impairment.

5) Certain cancers (colorectal cancer, endometrial cancer, breast cancer)

- The common underlying cause is the transformation of normal cells into tumors due to changes (mutations) in genetic material, such as DNA.
- Although the mechanisms by which physical activity prevents and improves cancer outcomes are unclear, it is conjectured that it may reduce tumor growth through several mechanisms, including the improvement of immune function.

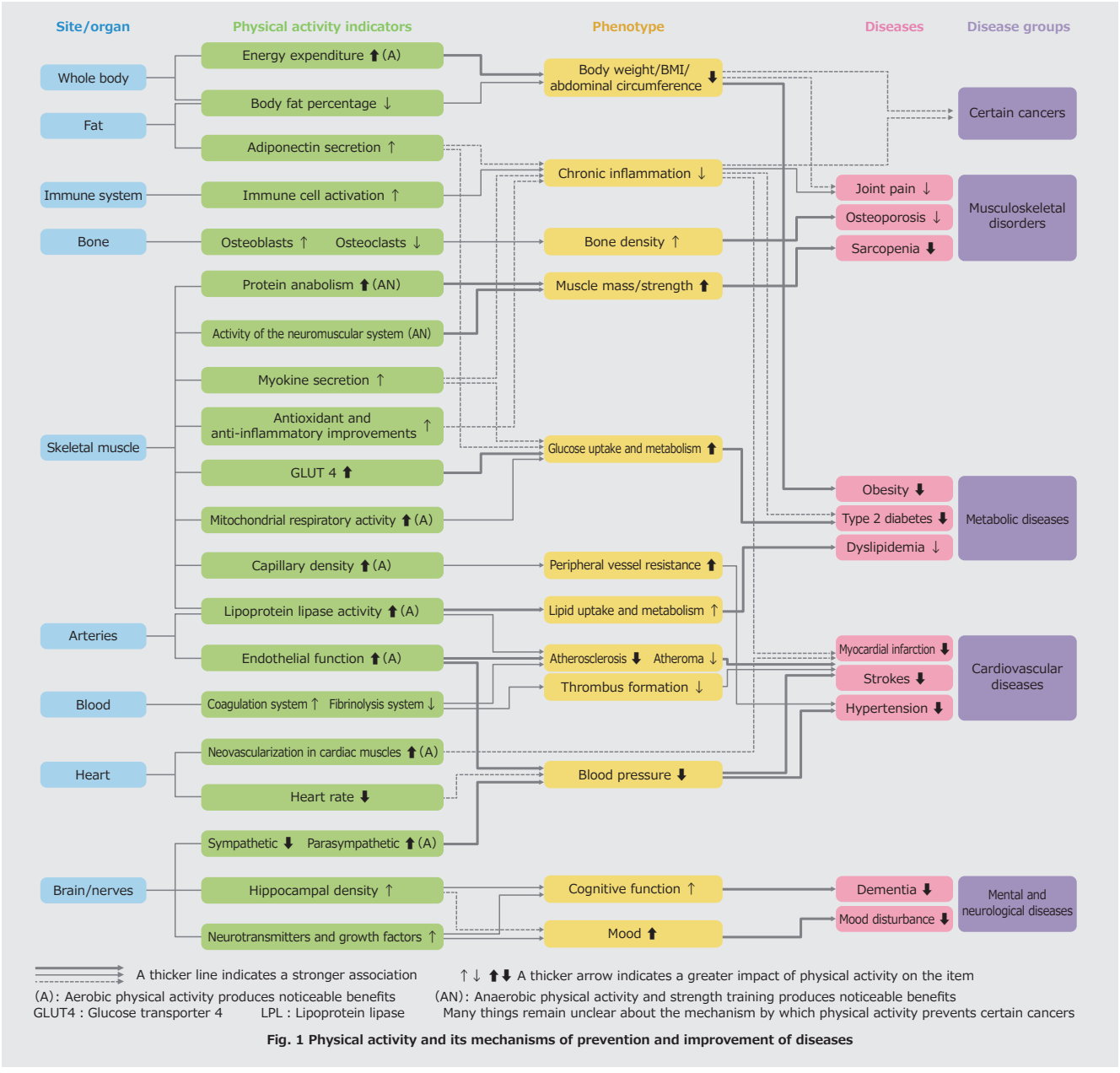

Fig. 1 Physical activity and its mechanisms of prevention and improvement of diseases

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INFORMATION 6

CARDIORESPIRATORY FITNESS (PEAK OXYGEN UPTAKE)

POINTS

- A review of studies on cardiorespiratory fitness in Japanese individuals was conducted, and reference values were established by gender and age group.
- Accordingly, health fitness instructors are recommended to use these new reference values as guides when providing exercise instruction.

1 Importance of cardiorespiratory fitness and the need to revise the reference values

- The peak oxygen consumption per kilogram of body weight ($\dot{V}O_2$peak/kg; units: mL/kg/min or METs), an indicator of cardiorespiratory fitness, is a powerful predictor of mortality and disease onset from various causes, similar to the more precisely measured maximal oxygen consumption ($\dot{V}O_2$max/kg). Thus, it is recommended to maintain and improve cardiorespiratory fitness through engagement in physical activity and exercise.
- The Ministry of Health, Labour, and Welfare has provided reference values for cardiorespiratory fitness by sex and age group in the "Physical Activity Reference for Health Promotion 2013."[1] These reference values are intended to indicate the levels of endurance expected to reduce the risk of developing lifestyle-related diseases and the associated mortality.
- To effectively utilize the reference values for cardiorespiratory fitness in health promotion settings, one must first clarify the reference values (e.g., mean, median, standard deviation, and confidence intervals) that reflect the actual conditions of the Japanese population. However, there have been no previous attempts in Japan—aside from the abovementioned 2013 Reference document—to establish reference values for cardiorespiratory fitness.
- To establish reference values for cardiorespiratory fitness, the ideal approach would be to conduct large-scale measurements using a representative sample. Nonetheless, owing to the significant economic and time costs associated with sampling and actual measurement, this has proven to be a challenging endeavor.
- Instead, after collecting and integrating research results from studies measuring cardiorespiratory fitness in the Japanese population, we have estimated the reference values (mean and distribution) for cardiorespiratory fitness. By comparing these estimated reference values with those in the "Physical Activity Reference for Health Promotion 2013," we have revised and updated the old reference values.

2 Scientific rationale

- According to the results of recent systematic reviews and meta-analyses focusing on cohort studies examining the relationship between cardiorespiratory fitness and mortality and the incidence of non-communicable diseases, there is a linear inverse dose–response relationship between these variables. Specifically, for each additional MET of cardiorespiratory fitness, the relative risk of total mortality and cardiovascular disease mortality decreases by approximately 10–20%[2,3]. Therefore, even slight improvements in cardiorespiratory fitness are expected to provide significant health benefits.

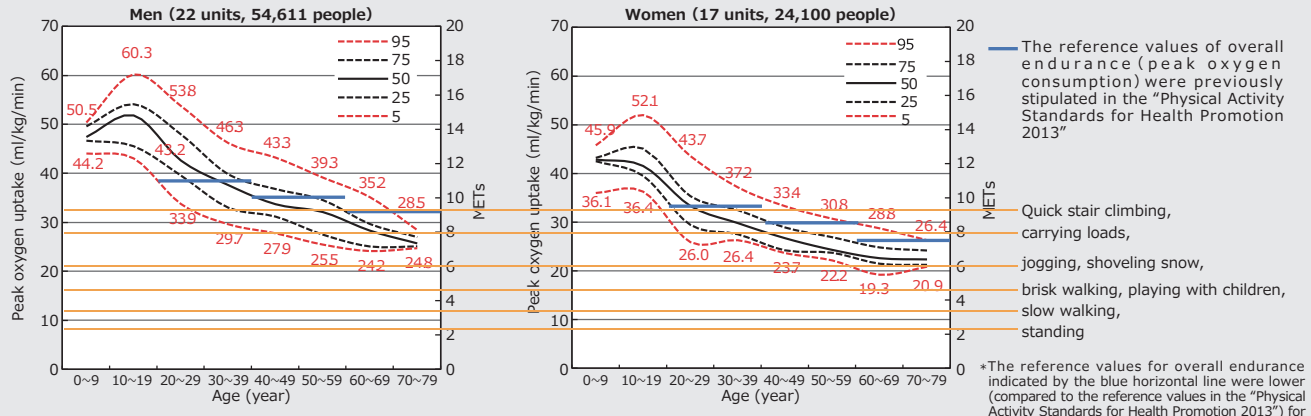
3 Current status

- To ascertain the current status of cardiorespiratory fitness in Japanese individuals, a systematic review of studies with descriptive statistics of $\dot{V}O_2$peak/kg for the Japanese population was conducted, and standard values were estimated[4]. After searching literature using PubMed, Ichushi-Web, and Google Scholar, 2 researchers independently reviewed the identified literature, resulting in the selection of 23 original research articles. From these selected studies, mean values and standard deviations of $\dot{V}O_2$peak/kg were extracted from a total sample of 54,611 men and 24,100 women, and the data were integrated to calculate the estimated mean values and distribution.
- Tables 1 and Figure 1 present the estimated mean values and distribution of $\dot{V}O_2$peak/kg in Japanese individuals according to sex and age group. The results show that $\dot{V}O_2$peak/kg increases up to teenage years but then decreases with aging after the 20s. This decline is not linear; it decreases more dramatically during the 20s and 30s, but slower after the 40s. Moreover, approximately 50% of men in their 60s and women in their 40s can sustain an activity with an intensity of 8 METs for more than 3 min, such as carrying heavy loads.

Table 1. Estimated mean values (mL/kg/min) of cardiorespiratory fitness ($\dot{V}O_2$peak/kg) according to sex and age

- Cardiorespiratory fitness is measured using expiratory gas analysis during a maximal incremental exercise test on a bicycle ergometer or treadmill.
- It can be estimated from the relationship between intensity and heart rate during 2–3 stages of a maximal exercise test and from the maximal heart rate.
- Estimates can also be derived from the results of field tests, such as the 20-meter shuttle run or the 6-minute walk test.
- Estimation can be performed using wearable devices.

	10–19 years	20–29 years	30–39 years	40–49 years	50–59 years	60–69 years	70–79 years
Men	51.2	43.2	37.6	34.5	31.7	28.6	26.3
Women	43.2	33.6	30.6	27.4	25.6	23.4	23.1



*The reference values for overall endurance indicated by the blue horizontal line were lower (compared to the reference values in the "Physical Activity Standards for Health Promotion 2013") for men in their 20s, but higher for men in their 50s and older and for women in their 30s and older.

Fig. 1 Overall endurance by gender and age group according to estimated reference values (mean and 5–95% percentiles) of peak oxygen consumption

4 Revision of reference values

- The reference values for cardiorespiratory fitness provided in the "Physical Activity Reference for Health Promotion 2013" are 1–1.5 METs lower than the estimated mean for Japanese men in their 20s, as approximately 90% of these men met the old reference values. In contrast, for those aged 50 years and older, the old reference values are 1–1.5 METs higher than the estimated mean for both men and women, with only 5–25% of individuals in this age group meeting the old reference values. If the reference values deviate from the actual conditions of the population, there is a risk of creating incorrect perceptions among many individuals and groups engaged in health promotion, such as that they are "easily exceeding the reference values" or that "it is impossible to meet the reference values." Therefore, based on existing epidemiological research evidence and the newly estimated reference values, Table 2 presents the new reference values for cardiorespiratory fitness according to one's sex and age group.

Table 2. New reference values in METs of cardiorespiratory fitness according to gender and age group

- If an individual can sustain a physical activity or lifestyle activity at the MET value listed below for approximately 3 min, it is considered that the person meets the reference values for cardiorespiratory fitness.
- The METs value can be multiplied by 3.5 to convert it to the reference value for maximum oxygen uptake (unit: mL/kg/min).
- The values for ages 10–19 years are considered guideline recommendations because the relationships between cardiorespiratory fitness and mortality or disease risks in this age group are not clearly established.

*The values in the 2013 rows are the reference values present in the "Physical Activity Reference for Health Promotion 2013"

	10–19 years	20–29 years	30–39 years	40–49 years	50–59 years	60–69 years	70–79 years
Men	14.5 (guide)	**12.5**	**11**	**10**	**9**	**8**	**7.5**
2013	None	11	11	10	10	9	None
Women	12.0 (guide)	**9.5**	**8.5**	**7.5**	**7**	**6.5**	**6**
2013	None	9.5	9.5	8.5	8.5	7.5	None

5 Ways to evaluate cardiorespiratory fitness

- $\dot{V}O_2$peak/kg is the peak value of oxygen consumption observed during incremental exercise tests using a bicycle ergometer or treadmill through expiratory gas analysis. Measuring $\dot{V}O_2$peak/kg requires expensive exercise stress equipment, expiratory gas analysis devices, and advanced technical skills, making it difficult for individuals to easily measure this index on their own.
- Alternatively, some fitness institutions estimate $\dot{V}O_2$peak/kg by analyzing the relationship between exercise intensity and heart rate during 2–3 stages of maximal exercise tests that do not lead to exhaustion.
- Additionally, $\dot{V}O_2$peak/kg can be estimated from the results of field tests such as the 20-meter shuttle run and the six-minute walk tests, which are used in the physical fitness and exercise capacity surveys conducted by the Japan Sports Agency.
- Questionnaires used in specific health checkups often include a simple evaluation of cardiorespiratory fitness by assessing walking speed.
- Recently, methods for estimating $\dot{V}O_2$peak/kg using wearable devices, which measure distance traveled and heart rate during movement, are becoming more common.

6 Ways to maintain or improve cardiorespiratory fitness ($\dot{V}O_2$peak/kg)

- $\dot{V}O_2$peak/kg serves as an index of one's capacity to take in oxygen from the air through the lungs, transport it from the heart throughout the bloodstream, and produce the energy required for physical activity by breaking down sugars and fats in the working muscles.
- Improving $\dot{V}O_2$peak/kg can be effectively achieved by regularly engaging in aerobic activities such as walking, running, and swimming. For effective results, it is recommended to engage in moderate- to vigorous-intensity aerobic activities for 30 min per session at least 3 times/week. To balance safety and effectiveness, the intensity should be around 50–75% of $\dot{V}O_2$peak/kg, which should subjectively feel like a "slightly hard" effort.

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INFORMATION 7

PHYSICAL ACTIVITY ENVIRONMENTS

POINTS

- Valuable initiatives for the creation of environments that support physical activity have been organized into 4 categories, as shown below. The recommendation is for invested stakeholders to pursue all of these initiatives as much as possible and avoid focusing on just one.

1. **Creating physical environments that promote lifestyle activities**: Develop spaces that encourage daily activities, such as by designing urban and transportation plans that promote walking and cycling, adopting urban and architectural designs that encourage physical activity, and creating workplace environments that prevent excessive sitting.
2. **Creating social environments that promote lifestyle activities**: Increase opportunities for daily activities, such as revitalizing community activity initiatives and increasing opportunities for social participation among older adults.
   - Create social environments that encourage walking and cycling, such as for commuting to work, school, or shopping.
   - The promotion of activities like standing meetings and the use of stairs in the workplace can help increase lifestyle activity in work settings.
3. **Creating physical environments that promote exercise**: Develop spaces that facilitate engagement in exercise, such as by building exercise facilities, walking paths, parks, playgrounds, schoolyards, and natural environments.
4. **Creating social environments that promote exercise**: Increase the number of opportunities for engagement in exercise, including increasing opportunities for children to exercise (e.g., through physical education, extracurricular activities, and outdoor play), promoting sports and exercise, enhancing exercise programs provided by the private and public sectors, increasing the availability of exercise companions and instructors, and strengthening physical activity and exercise guidance in healthcare settings.
   - Improve access to exercise by raising awareness of exercise locations and opportunities.

1 Background and key recommendation points

- Regular physical activity is essential for a healthy life. However, despite various past efforts, physical activity among the population continues to decline.
- This trend is partly due to community environmental changes that have reduced opportunities for engaging in physical activity. For example, the increased reliance on automobiles and widespread use of the internet has reduced opportunities for movement.
- To solve the related problems, it is necessary not only for individuals to try to increase their physical activity but also for governments and organizations to change the environments in communities, workplaces, and schools to promote greater engagement in physical activity.
- This guide provides suggestions regarding organized environmental improvements as shown in the table below. It is essential for the projects to address all four initiative categories. Effectively advancing these initiatives will require collaboration across multiple sectors, including health education, urban planning, and public transportation.

	Lifestyle activities like walking, cycling, working, and household chores	Exercise like leisure time exercise and sports
Creating physical environments (developing and enhancing locations)	**Urban Planning, Community, and Workplace Environment Creation** **Macro-environment** • Urban planning: building community environments that promote physical activity. • Transportation planning: public transportation policies that promote physical activity. **Microenvironment** • Urban and architectural design that promote physical activity: nudges, safe and comfortable sidewalks, bicycle paths, stairs, public squares, and buildings that promote physical activity. • Workplace environment improvements: developing office layouts, standing desks, facilities for standing meetings, staircases, shared spaces, and providing bicycle parking and shower rooms.	**Creating Exercise Spaces** • Developing and attracting exercise facilities. • Creating walking and cycling paths. • Developing parks and green spaces. • Establishing playgrounds and safe outdoor areas for children to play. • Designing and constructing daycare centers and kindergartens. • Enhancing natural environments (e.g., mountains, riversides, and coastlines).
Creating social environments (creating and providing opportunities)	**Creating and Increasing Opportunities for Physical Activity** • Promoting active travel: encouraging walking, cycling, and the use of public transportation for commuting to work/school and shopping (mobility management). • Revitalizing community activities and fostering social capital. • Increasing opportunities for engagement in physical activity among older adults: developing opportunities for employment, social participation, community-based gathering place, outings, and enhancing household roles (e.g., facilitating engagement in household chores). • Workplace: implementing organizational policies, adjusting working hours, offering workplace-led health classes, providing incentives, introducing standing meetings, promoting stair use, and reducing engagement in prolonged sedentary behaviour (e.g., sitting). **Information Provision and Communication** • Disseminating and promoting the "Physical Activity and Exercise Guide 2023" and conducting campaigns to encourage physical activity	**Children** • Increasing physical education, extracurricular sports activities, and opportunities for outdoor play. **Promotion of Exercise and Sports** • Promoting community sports clubs, sports events, and the sports industry. **Exercise Programs** • Increasing the exercise programs offered by local governments and private organizations. • Utilizing radio calisthenics and local exercise routines. **Companions and Instructors** • Supporting individuals in finding exercise companions and facilitating the development of self-directed exercise groups. • Enhancing the quality and increasing the number of exercise instructors. **Medical and Healthcare** • Enhancing physical activity and exercise guidance in the context of medical and healthcare. • Increasing the number and quality of healthcare professionals (e.g., doctors) who can provide exercise guidance. **Improving Access** • Raising awareness and improving access (i.e., spatial, temporal, and economic) to exercise locations and opportunities. **Information Provision and Communication** • Disseminating and promoting the "Guidelines on Physical Activity and Exercise for Health Promotion 2023" and conducting campaigns to encourage exercise.

2 Creating physical environments that promote lifestyle activities (locations for lifestyle activities)

- Lifestyle activities refer to physical activities carried out in daily life, including moving your body while doing household chores, walking, or cycling to commute to work/school, being physically active during work, walking while shopping or visiting a friend's house.
- The recommendation is for creating community environments where people can rely less on cars and more on walking, cycling, or public transportation for commuting, as it naturally increases physical activity, which in turn helps maintain and improve health.
- To create an environment where people can naturally become healthier, it is important to increase 'Walkable Urban Areas' promoted by the Ministry of Land, Infrastructure, Transport and Tourism, and develop city centers that are "comfortable and inviting to walk in." Additionally,

collaboration with urban planning departments is necessary for creating communities where people can live and get around on foot.
- Areas with good access to public transportation are known to allow people to engage in higher levels of physical activity.
- In microenvironments (e.g., urban spaces or architectural designs), thoughtful planning can enable the promotion of walking, cycling, outings, and stair use. Examples include the development of pedestrian and cycling spaces, innovative building designs, and the enhancement of public squares and aesthetics. Creative "nudges" to encourage physical activity are also possible.
- Workplace environment improvements also support physical activity and prevent excessive engagement in sedentary behaviour (e.g., sitting). Examples include strategic placement of shared equipment (e.g., break areas and copy machines), the introduction of standing desks, and the installation of facilities for standing meetings.

3 Creating social environments that promote lifestyle activities (opportunities for lifestyle activities)

- Daily activities like commuting, work, household chores, and leisure are performed for various purposes other than exercise. Increasing opportunities for engagement in these activities contributes to health promotion.
- Many studies have confirmed that active commuting has health benefits.
  - **Commuting to work**: Consider ways to increase the number of people commuting by walking, cycling, or using public transportation instead of driving.
  - **Commuting to school**: School commuting provides important opportunities for children to engage in physical activity. There is the need to ensure a safe environment that supports active commuting. School consolidation or safety concerns might lead to the introduction of school buses, in turn potentially reducing walking when commuting to school. An alternative when introducing school buses may be to place the school bus parking area a short distance away from the school, while ensuring safety.
  - **Shopping**: Improve shopping environments and establish measures to increase the number of people who shop by walking, cycling, or using public transportation instead of driving.
- In the workplace, measures that promote opportunities for engagement in lifestyle activities include policies regarding health promotion, prevention of long working hours, implementation of health classes, introduction of incentives, and the adoption of standing meetings.
- Community activity revitalization and the fostering of social capital are expected to positively impact engagement in physical activity.
- Social participation often involves engagement in physical activity. For older adults, increasing opportunities for such participation is particularly effective in promoting physical activity.
  - Increasing opportunities to engage in employment, community activities, hobbies, community-based gathering place, and outings is especially important for older adults.
  - These measures are expected to contribute not only to physical activity but also to the maintenance and improvement of cognitive function and the quality of life.
- Promote awareness of lifestyle activity engagement and its benefits.
  - Use physical activity promotion campaigns to increase knowledge about physical activity and encourage behavioural changes. It is effective to combine—using a multifaceted approach—these measures with other environmental improvements, events, and physical activity programs, rather than just providing information.

4 Creating physical environments that promote exercise (locations for exercise)

- Exercise can take place in various locations, such as exercise facilities, schoolyard, roads, parks, and natural environments.
- There should be efforts to develop exercise facilities such as gyms, sports fields, and swimming pools.
- Walking paths, bicycle paths, parks, green spaces, and natural environments are important venues for exercise. These areas should be made suitable for engagement in exercise.
- Improve environments where children can engage in physical activity, such as playgrounds, places where children customarily gather, and facilities like daycares and kindergartens.
- Constructing new facilities is not always easy. Thus, stakeholders should check if existing facilities are suitable for exercise for many residents and improve them.

5 Creating social environments that promote exercise (opportunities for exercise)

- Increase exercise opportunities for children and adolescents.
  - Enhance opportunities for exercise through physical education, extracurricular activities, and recess.
  - Ensure opportunities for outdoor play.
- Increase opportunities for exercise, by improving community sports clubs, sports and exercise events, exercise programs provided by the private and public sectors, and promoting local exercise routines and radio calisthenics.
- Develop opportunities for exercising with companions, self-directed exercise groups, and qualified exercise instructors.
- Ensure that the necessary physical activity and exercise guidance are reliably provided in medical and healthcare settings.
- Increase accessibility to exercise locations and opportunities.
  - Even if exercise locations and opportunities are well-established, poor accessibility can prevent their use. This requires giving due consideration to potential barriers such as a lack of awareness, transportation issues, unclear application procedures, incompatible facility hours, high costs, unsuitable participation conditions, or complex procedures. There should be efforts to ensure that existing facilities and programs are effectively utilized.
- Promote awareness of exercise and its benefits.
  - Use exercise promotion campaigns to increase related knowledge and encourage behavioural changes. It is effective to combine these campaigns with other environmental improvements, events, and exercise programs, rather than just providing information, hence making for a multifaceted approach to exercise promotion.

6 Collaboration with other departments

- The creation of environments often requires collaboration across various fields of society, such as urban planning, public transport, education, and sports. Indeed, the "Global action plan on physical activity 2018-2030" published by the WHO in 2018 emphasized the notion of "multiple opportunities, multiple benefits" as a key concept. This notion describes that opportunities for promoting physical activity are diverse, and various policies and measures that might not immediately seem related to physical activity or health may actually be interconnected.
- Challenges in one area can sometimes lead to solutions in another. For example, urban planning policies may contribute to increased engagement in physical activity, and initiatives to promote physical activity might enhance crime prevention efforts. This showcases the need to recognize that collaboration across different departments can be key to solving challenges associated with the population's engagement in physical activity and exercise.

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INFORMATION 8

PHYSICAL ACTIVITY AND ENERGY/NUTRIENTS

POINTS

- To maintain and enhance health, it is essential to balance energy intake with expenditure based on physical activity levels and to consume appropriate amounts of essential nutrients.
- An increase in muscle mass is not directly proportional to the total protein intake, making it important to consume protein according to the level of engagement in physical activity.
- To lose 1 kg of body fat, approximately 7,000 kcal of energy is required. For individuals with obesity, achieving weight loss often requires proper planning and adjustments in energy intake and expenditure through physical activity and diet.

1 Physical activity and nutrients

- To maintain and enhance health, it is fundamental to keep a proper energy balance and consume appropriate amounts of essential nutrients. Additionally, the required amounts of energy and nutrients vary according to physical activity levels.
- Nutrients that produce energy include proteins, fats, and carbohydrates. The proportion of each of these components in the total energy intake is referred to as the energy-producing nutrient balance.
- Since energy and nutrients are obtained from food, it is necessary to adjust one's diet to ensure the intake of the right types and amounts of nutrients.
- The basic principle for determining what and how much to eat is called nutrient balance, and the required amounts are indicated by dietary reference intakes for Japanese, which serve as a guide.
- The International Olympic Committee points out that individuals engaging in intense exercise, like top athletes, can experience negative effects on health and performance owing to relative energy deficiency[2,3]. When physical activity levels increase and energy deficiency occurs in non-athletes, symptoms similar to those occurring in athletes can arise. Therefore, it is important to monitor physical activity levels and ensure adequate energy and nutrient intake.

2 Physical activity and protein intake

- A lack of physical activity can lead to a catabolic state of proteins, whereas moderate engagement in physical activity enhances dietary protein use. Meanwhile, vigorous physical activity increases protein breakdown, resulting in protein requirements following a U-shaped curve relative to physical activity intensity[4].
- According to a systematic review[5], a positive dose–response relationship was observed between the daily total protein intake and muscle mass increase. Specifically, an increase of 0.1 g of protein per kilogram of body weight per day could result in a muscle mass gain of 0.39 kg over 2 to 3 months. However, when daily protein intake exceeds 1.3g per kilogram of body weight, the efficiency of muscle mass gain decreases, indicating that the relationship is not strictly linear; simply consuming more protein does not necessarily lead to more muscle gain. Moreover, consuming protein in excess of what is necessary may increase the risk of health issues[6], including kidney dysfunction. This makes it crucial to adjust protein intake according to one's physical activity levels.
- In the case of chronic kidney disease, protein intake can accelerate the decline in kidney function, which explains the general recommendation to restrict protein intake among individuals with impaired kidney function. Additionally, older adults, along with people with conditions such as hypertension and diabetes, may have underlying kidney dysfunction and should consult with their primary care physician about physical activity and protein intake.

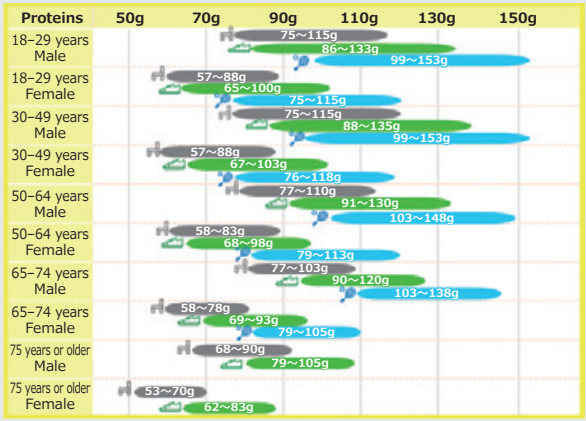
➢It is important to consume the required amounts of protein in your daily diet. The recommended amounts, adjusted according to age and activity level, are provided herein. Please review them.

Check 1 **Which of the following most closely resembles your typical daily routine?**

Low	Moderate	High
Sitting almost the whole day.	Spending much of my daily time sitting, but moving for household chores, commuting to work, shopping, and engaging in light sports activities.	Spending most of my daily time moving or standing while working, and frequently engage in sports activities.

Check 2 **Find your target protein intake according to your age, sex, and activity level from the figure on the right.**

Note: If you have health concerns such as reduced kidney function, consult to your primary care physician.



Referred from the frailty prevention project for older adults called "Eat Well to Prevent Frailty," which used the Ministry of Health, Labour, and Welfare's FY2019 Dietary Reference Intakes

3 Approach to energy adjustment for the reduction of visceral fat in Japanese Specific Health Guidance

- For health promotion purposes, it is important to combine appropriate amounts of physical activity with a balanced diet. To lose 1 kg of body fat, approximately 7,000 kcal of energy need to be expended.
- Particularly for individuals with obesity, weight loss should be a planned effort that involves adjustments to energy intake from food and energy expenditure from physical activity.

Step 1 The current me Height [ ] cm, Body weight [ ] kg, BMI [ ] kg/m²

The difference is [a] kg

Step 2 My goal **Target body weight [ ] kg**

Estimated time of achievement --- approximately [ ] months [ ] days ➡ after [b] months

Step 3 The plan needed to achieve the goal

The daily amount of energy you want to reduce to achieve your goal is calculated as follows:

[a] kg ×7,000 kcal ÷ [b] months ÷ 30 days = **[ ] kcal/day**

*If your weight has not changed over the past year, no correction is needed.
*If your weight has increased over the past year, add the **excess energy amount** as a correction.
•If your body weight increases by ( ) kg over the past year:
( ) (kg)× 7,000 kcal ÷ 365 days = **excess energy amount (kcal/day)**

Correction

When adjusting for excess energy intake, consider reducing the energy amounts from both physical activity and diet.

[A] kcal/day by physical activity + **[B] kcal/day** by diet = **[ ] kcal/day**

Reduce [A] kcal/day by physical activity

	Normal walking	Golf	Brisk walking	Bicycle (light load)	Light jogging	Tennis (singles)	Swimming	Running
Intensity (in METs)	3.0	3.5	4.0	4.0	6.0	7.0	8.0	8.0
Duration	10 Minutes	10 Minutes	10 Minutes	10 Minutes	10 Minutes	10 Minutes	10 Minutes	10 Minutes
Physical activity level (METs/hour)	0.5	0.6	0.7	0.7	1.0	1.2	1.3	1.3
Energy expenditure by body weight (unit: kcal)								
50 kg	15	20	25	25	40	50	60	60
60 kg	20	25	30	30	50	60	75	75
70 kg	25	30	35	35	60	70	85	85
80 kg	30	35	40	40	70	85	100	100

*Energy expenditure is calculated by subtracting the resting energy amount from the value obtained using the formula intensity (METs) × time (h) × weight (kg), and is expressed in units of 5 kcal.

Reduce [B] kcal/day by diet

Energy control
· Food amount
· Cooking method
· Confectionery
· Alcohol

Food quality control
· Lipids ⇒ Meat, fish, dairy products, cooking oil, and eating out
· Carbohydrates ⇒ Cereals, grains, and sugar
· Salt ⇒ Pickles, processed food, noodle soup, and seasoning
· Vitamins, minerals, and dietary fiber ⇒ Vegetables, fruits, and seaweed
· Cholesterol, purines ⇒ Meat, fish, and egg

Control how the food gets eaten
· Frequency (e.g., number of meals and snacks)
· Timing (e.g., when to eat)
· Speed of eating

· Regional dietary habits
· Food environment
· Lifestyle

Specific eating behaviour
· Changing the quantity of food eaten
· Varying food combinations
· Changing the cooking method
· Changing ingredients
· Changing seasoning
· Changing snacking or alcohol drinking habits
· Changing the frequency and timing of meals
· Changing high-frequency and highly-impactful eating behaviours

Refer to: Ministry of Health, Labour, and Welfare's Report on the Review and Revision of Exercise Reference and Guidelines (2012)

- Energy balance is defined as the difference between energy intake and energy expenditure (see Figure 1). In adults, the outcome of this balance is reflected in body weight and changes in body composition. If energy intake persistently exceeds energy expenditure (positive energy balance), body weight will increase. Conversely, if energy expenditure exceeds energy intake (negative energy balance), body weight will decrease.
- An energy imbalance should be adjusted over a long period of time by modifying energy intake, energy expenditure, and body weight, as these factors interact with each other. For example, sustained energy restriction leads to changes in body weight, which in turn necessitates adjustments in energy expenditure and intake, eventually achieving an energy balance of zero and stabilizing body weight.
- In individuals with obesity and who are underweight, if there are no changes in body weight or body composition, it can be assumed that energy intake and energy expenditure are equal.

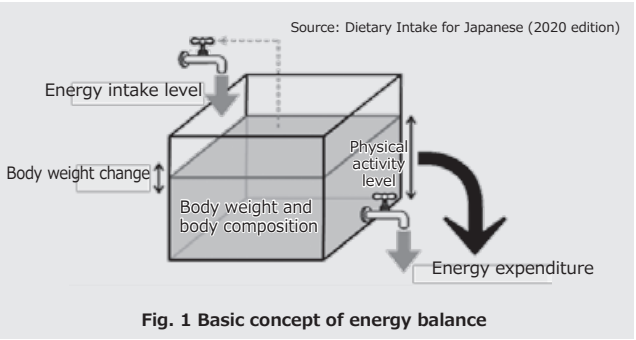


Fig. 1 Basic concept of energy balance

[References]
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2. Mountjoy M, Ackerman KE, Bailey DM, et al. 2023 International Olympic Committee's (IOC) consensus statement on Relative Energy Deficiency in Sport (REDs). Br J Sports Med. 2023;57(17):1073-1097.
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4. Millward DJ, Bowtell JL, Pacy P, et al. Physical activity, protein metabolism and protein requirements. Proc Nutr Soc. 1994;53(1):223–240.
5. Tagawa R, Watanabe D, Ito K, et al. Dose-response relationship between protein intake and muscle mass increase: a systematic review and meta-analysis of randomized controlled trials. Nutr Rev. 2020;79(1):66–75.
6. Van Elswyk ME, Weatherford CA, McNeill SH. A systematic review of renal health in healthy individuals associated with protein intake above the US recommended daily allowance in randomized controlled trials and observational studies. Adv Nutr 2018;9(4):404–418.

5. Conclusions

This guide has been developed based on the scientific knowledge available as of 2023. At the time of its creation, the scientific evidence in Japan was deemed insufficient to provide specific recommendations for pregnant women or individuals with disabilities. Additionally, future research is needed to evaluate the health impacts of interrupting sedentary behaviour. This guide includes new recommendations for engaging in strength training, suggesting a frequency of 2 to 3 times per week. To optimize health promotion, further scientific research is needed to develop tailored physical activity and exercise recommendations for various age groups, sexes, and fitness levels.

Additionally, it is desirable to regularly review and update this guide, incorporating interim and final evaluations from "Healthy Japan 21 (the third term)" as well as newly available scientific knowledge.

[References]

Table of Physical Activities and their MET values

METs	Examples of lifestyle activities with an intensity of 3 METs or more
3.0	Normal walking (on level ground at a pace of 67 m/min or with a dog), riding an electric-assisted bicycle, organizing household items, helping in the kitchen, packing, and playing the guitar (while standing)
3.3	Sweeping the carpet, the floor, vacuuming, and watching sports that involve physical movement
3.5	Walking (on level ground, 75–85 m/min, at a moderate pace, such as going for a stroll), riding a bicycle comfortably (8.9 km/h), going down stairs, carrying light luggage, loading and unloading a car, packing, mopping, floor polishing, cleaning the bathroom, weeding the garden, pushing a wheelchair, and driving a scooter (moped) or motorcycle
4.0	Riding a bicycle (at less than 16 km/h, such as for commuting), climbing stairs (slowly), playing with animals (walking/running at a moderate intensity), caring for older adults, caring for a person with disabilities (e.g., helping with dressing, bathing, getting in and out of bed), and removing snow from a roof
4.3	Brisk walking (on level ground at a slightly fast pace of 93 m/min), planting saplings, and farm work (e.g., feeding livestock)
4.5	Farming and house repairs
5.0	Fast walking (on level ground at a quick pace of 107 m/min) and playing with animals (while actively walking/running)
5.5	Shoveling soil or mud
5.8	Playing with children (actively walking/running), moving, or carrying furniture and household items
6.0	Shoveling snow with a spade
7.8	Farm work (gathering hay, cleaning the barn)
8.0	Carrying heavy loads
8.3	Carrying items upstairs
8.8	Climbing stairs (quickly)

METs	Examples of lifestyle activities with an intensity of less than 3 METs
1.8	Standing (e.g., talking on the phone or reading) and washing dishes
2.0	Slow walking (on flat ground at a very slow pace of less than 53 m/min, strolling, or walking inside the house), cooking and preparing food (e.g., standing or sitting), doing laundry, standing while holding a child, and washing and waxing a car
2.2	Playing with children (e.g., sitting and light activity)
2.3	Gardening (e.g., using containers), caring for animals, and playing the piano
2.5	Watering plants, taking care of children, and sewing or tailoring
2.8	Slow walking (on flat ground at a slow pace of 53 m/min) and playing with children or animals (e.g., standing and light activity)

Modified from the National Institute of Health and Nutrition's revised "METs Table for Physical Activities"
https://www.nibiohn.go.jp/eiken/programs/2011mets.pdf

Table of Exercises and their MET values

METs	Examples of exercises with an intensity of 3 METs or more
3.0	Bowling, volleyball, ballroom dancing (e.g., waltz, samba, and tango), pilates, and tai chi
3.5	Cycling on an ergometer (30–50 watts), gymnastics (e.g., light to moderate intensity at home), and golf (e.g., using a hand-pulled cart)
3.8	Moderate-intensity strength training (e.g., push-ups and sit-ups)
4.0	Table tennis, power yoga, and radio calisthenics No. 1
4.3	Brisk walking (on level ground at a moderately fast pace of 93 m/min) and golf (carrying clubs)
4.5	Tennis (doubles), water walking (at a moderate intensity), and radio calisthenics No. 2
4.8	Swimming (doing a slow backstroke)
5.0	Fast walking (on level ground at a fast pace of 107 m/min), baseball, softball, surfing, ballet (e.g., modern and jazz), and strength training (squats)
5.3	Swimming (doing a slow breaststroke), skiing, and aqua aerobics
5.5	Badminton
6.0	Slow jogging, weight training (e.g., vigorous intensity, powerlifting, and bodybuilding), basketball, and leisurely swimming
6.5	Climbing a mountain or carrying 0–4.1 kg of luggage
6.8	Cycling on an ergometer (90–100 watts)
7.0	Jogging, soccer, skiing, skating, and handball
7.3	Aerobics, tennis (singles), and mountain climbing or carrying approximately 4.5–9.0 kg of luggage
8.0	Cycling (about 20 km/h) and vigorous-intensity strength training (e.g., push-ups and sit-ups)
8.3	Running (at 134 m/min), swimming (doing freestyle swimming at moderate pace of less than 46 m/min), and rugby
9.0	Running (at 139 m/min)
9.8	Running (at 161 m/min)
10.0	Swimming (doing freestyle swimming at a fast pace of 69 m/min)
10.3	Martial arts (e.g., judo, jujitsu, karate, kickboxing, and taekwondo)
11.0	Running (at 188 m/min) and cycling on an ergometer (161–200 watts)

METs	Examples of exercises with an intensity of less than 3 METs
2.3	Stretching
2.5	Yoga, billiard
2.8	Seated radio calisthenics and light strength training (abdominal exercise)

Modified from the National Institute of Health and Nutrition's revised "METs Table for Physical Activities"
https://www.nibiohn.go.jp/eiken/programs/2011mets.pdf

International Trends in Physical Activity

There have been many advances in research in the fields of physical activity globally, and their findings are being utilized in international frameworks and national policies worldwide. In general, the trends in the international physical activity fields are as follows.

• The Lancet Physical Activity Special Issue (Report 1: 2012[8], Report 2: 2016[9])

In 2012, The Lancet, an international medical journal, published a special issue on physical activity, reporting that physical inactivity is a global "pandemic" and that its health impacts are on par with those of tobacco. The report indicated that 5.3 million deaths worldwide each year were attributable to physical inactivity.

In 2016, the journal released the second report in this special issue, highlighting that there had been no significant changes in the global situation regarding physical inactivity. It also emphasized that addressing this issue will require collaboration across multiple sectors, including the industrial sector, and the scaling up of interventions.

• Global Action Plan on Physical Activity 2018–2030 (2018)[10]

In 2018, in response to the global spread of physical inactivity, the World Health Organization developed the "Global Action Plan on Physical Activity 2018–2030" (GAPPA). The plan sets specific targets to reduce the proportion of physically inactive individuals by 10% by 2025 and by 15% by 2030. It includes 20 recommended policy measures and interventions aimed at addressing physical inactivity.

•WHO Guidelines on Physical Activity and Sedentary Behaviour (2020)[11]

In 2020, the World Health Organization updated the "Global Recommendations on Physical Activity for Health (2010)" and issued the "Guidelines on Physical Activity and Sedentary Behaviour." These guidelines provide recommendations for physical activity across different life stages and specific recommendations for physical activity and sedentary behaviour aimed at pregnant women, individuals with chronic diseases, and those with disabilities.

8 Lancet. Physical Activity 2012. 2012;380(9838):219-305. http://www.thelancet.com/series/physical-activity
9 Lancet. Physical Activity 2016: Progress and Challenges. 2016;388(10051):1254-1348. http://www.thelancet.com/series/physical-activity-2016
10 World Health Organization. Global action plan on physical activity 2018-2030. 2018. https://iris.who.int/bitstream/handle/10665/272722/9789241514187-eng.pdf
11 World Health Organization. Guidelines on physical activity and sedentary behaviour. 2020. https://www.who.int/publications/i/item/9789240015128

Other Relevant Information

○Health Promotion Facilities and "Standardized Exercise Programs"

The Ministry of Health, Labour, and Welfare of Japan has established the "Health Promotion Facility Certification Regulations" to promote the health of the nation, certifying facilities that have appropriate contents and encouraging their use. The certification is divided into 3 types of facilities, as follows: exercise-based health promotion facilities, facilities utilizing hot springs for health promotion, and facilities offering hot spring-based programs for health promotion. Furthermore, among these health promotion facilities, those that meet specific conditions and are suitable for exercise therapy are designated as "designated exercise therapy facilities." Fees for using these facilities for exercise therapy, as long as the use is conducted under medical instruction, are eligible for medical expense deductions as stipulated in Article 73 of the Income Tax Law.

Regarding exercise at health promotion facilities, the Ministry of Health, Labour, and Welfare's website provides a "Standardized Exercise Program." This program is designed to serve as a reference for guiding preventive health practices and exercise therapy at health promotion facilities. It targets individuals at risk of developing or worsening lifestyle-related diseases, considers factors like disease status (e.g., hypertension, type 2 diabetes, and dyslipidemia) and age, and outlines specific types of exercise (e.g., walking, swimming, and strength training) along with details on exercise quantity (e.g., frequency, duration, and intensity).

(URL)
https://www.mhlw.go.jp/stf/seisakunitsuite/bunya/kenkou_iryou/kenkou/undou/index_00003.html

○About "e-Health Net"

This site is dedicated to public health promotion. In line with the implementation of specific health checkups and specific health guidance programs, the site provides accurate information to improve the lifestyle habits of citizens based on scientific knowledge.

(URL)
http://www.e-healthnet.mhlw.go.jp/

○About "e-Kenkozukuri Net (e-Promotion Net)"

This site provides information on health promotion and is aimed at individuals responsible for health support in local governments and similar entities. It is designed to support and train individuals involved in planning and implementing health promotion initiatives in local governments, companies, and organizations. It provides key points on health promotion, reference case studies, educational materials, and explanatory tools.

(URL)
https://e-kennet.mhlw.go.jp/

Member List of the "Review Committee on the Revision of Physical Activity Reference and Guidelines for Health Promotion"

(Honorifics omitted, in Japanese alphabetical order)

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(○: Chairperson)

Background of the "Review Committee on the Revision of Physical Activity Reference and Guidelines for Health Promotion"

	Date of Convocation	Topics discussed
First Meeting	26 Jun, 2023	• Previous efforts related to physical activity and exercise • Summary of the research team's findings towards the revision of the Physical Activity Reference and Guidelines for Health Promotion • Key issues regarding the revision
Second Meeting	31 Aug, 2023	• Revision of physical activity recommendations
Third Meeting	27 Nov, 2023	• Compiling the "Physical Activity Guide for Health Promotion 2023" (Draft)

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