Australian Government
Department of Health, Disability and Ageing

Australian 24-Hour Movement Guidelines for Adults (18-64 years) and Older Adults (65+ years):

An Integration of Physical Activity, Sedentary Behaviour and Sleep

Contents

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Executive summary

The Australian Government Department of Health, Disability and Ageing commissioned the development of the Australian 24-Hour Movement Guidelines for Adults (18-64 years) and Older Adults (65+ years). These guidelines represent a significant update to existing recommendations, taking an integrated approach that considers physical activity, sedentary behaviour, and sleep across a 24-hour period. For the first time in Australia, the guidelines also include specific recommendations for adults with disability and chronic health conditions, as well as considerations for Aboriginal and Torres Strait Islander people. This document is intended for use by policy makers, health professionals, and researchers, and it may be useful to members of the public.

Methodology

The guidelines were developed using the GRADE-ADOLOPMENT approach, which allowed for the adaptation or adoption of existing evidence-based guidelines while considering local context. The process involved:

- A comprehensive review of existing international guidelines
- Systematic reviews and updates of evidence
- Expert consensus through a Guideline Development Group
- Extensive stakeholder consultation including online surveys, focus groups, and public feedback
- Particular attention to priority populations such as people with disability, chronic conditions, and Aboriginal and Torres Strait Islander people

Key Recommendations

The guidelines provide specific recommendations across the three key behaviours; physical activity, sedentary behaviour and sleep, and are detailed on page 12 (Adults), page 15 (Older Adults), page 18 (Adults and Older Adults with Disability) and page 21 (Adults and Older Adults with Chronic Conditions) of this report. The key components of these recommendations are:

Physical Activity

- Moderate- to vigorous-intensity physical activities for 30 minutes or more on most days
- Muscle-strengthening activities on 2 or more days per week
- Functional activities targeting mobility, balance, and coordination on 3 or more days per week
- Several hours of light-intensity physical activity daily

Some physical activities can count towards multiple recommendations. For example, walking up and down stairs contributes to both your moderate-intensity activity and functional activity recommendations.

Sedentary Behaviour

- Limit the amount of time spent being sedentary
- Breaking up prolonged periods of sedentary behaviour

Sleep

- 7-9 hours of good quality sleep for adults (7-8 hours for older adults), with consistent bed and wake up times.

Future Directions

The guidelines are recommended to be updated every 10 years, unless significant advances in assessment methods or new evidence emerges. Key research gaps identified include:

- Need for more high-quality studies using device-measured physical activity, sedentary behaviour and sleep
- Additional research on priority populations
- Better evidence on optimal patterns of sedentary behaviour
- More comprehensive research on integrated behaviours

It is recommended that consumer facing materials are developed to support effective implementation.

Conclusion

These guidelines represent a significant advancement in public health guidance for Australia, providing evidence-based recommendations that consider the full 24-hour period and diverse population needs. The integrated approach and stakeholder engagement ensure the guidelines are both scientifically robust and practically applicable across different population groups.

Abbreviations

AGREE: Appraisal of Guidelines for Research & Evaluation

AMSTAR: Assessing the Methodological Quality of Systematic Reviews

CALD: Culturally and linguistically diverse

CI: Confidence interval

COPD: Chronic obstructive pulmonary disease

CVD: Cardiovascular disease

GRADE: Grading of Recommendations, Assessment, Development and Evaluation

HbA1c: Glycated haemoglobin

HR: Hazard ratio

ILD: Interstitial lung disease

LPA: Light-intensity physical activity

MDD: Major depressive disorder

MS: Multiple sclerosis

MSA: Muscle strengthening activities

MVPA: Moderate- to vigorous-intensity physical activity

NDIS: National Disability Insurance Scheme

PD: Parkinson's disease

PICO: Population, Intervention, Comparator, and Outcome

RCT: Randomised controlled trial

SCI: Spinal cord injury

TBI: Traumatic brain injury

QALY: Quality-adjusted life years

QoL: Quality of life

Glossary

Exercise: A subcategory of physical activity that is planned, structured, repetitive, and purposeful in the sense that the improvement or maintenance of one or more components of physical fitness is the objective.

Fitness: A measure of the body's ability to function efficiently and effectively in work and leisure activities, and includes, for example, physical fitness and cardiorespiratory fitness.

Functional activities that target mobility, balance and coordination: Exercises or activities that mimic activities of daily living, involving multiple joints and muscles working together. They focus on improving the body's ability to perform everyday movements safely and efficiently by increasing aerobic fitness, strength, balance, flexibility, and/or coordination.

Examples include standing up and down from a chair, reaching and stepping in standing, one-leg stands (standing on one foot whilst brushing teeth), toe raises, balancing on and stepping over obstacles, stepping up and down off a block, jumping, skipping, hopping and leaping, walking backwards and sideways, types of dance and three-dimensional exercise like yoga, Pilates, Tai Chi and Qigong.

Integrated Movement Behaviours: the composition of time spent in sleep, sedentary behaviour and physical activity within a 24-hour period.

Light-intensity physical activity: On a scale relative to an individual's personal capacity, light-intensity physical activity is usually a level 1 to a 3 on an RPE scale of 0–10 (Annex 1). Examples include activities where it is easy to maintain a conversation while doing them i.e. light household chores, slow walking, standing while doing dishes, cooking, playing a musical instrument, stretching, shopping, fishing, some recreational sports like golf.

Activity between 1.6 and 2.9 METs, i.e. activities with energy cost less than 3 times the energy expenditure at rest for that person.

Main muscle groups: these include the legs, back, abdomen, chest, shoulders and arms.

Metabolic equivalent of task (MET): The metabolic equivalent of task, or simply metabolic equivalent, is a physiological measure expressing the intensity of physical activities. One MET is the energy equivalent expended by an individual while seated at rest.

Moderate to vigorous intensity activity: On a scale relative to an individual's personal capacity, moderate-intensity physical activity is usually a 5 or 6 on an RPE scale of 0–10 (Annex 1). Examples include activities where you are out of breath but still able to have a conversation while doing them i.e., cycling, walking briskly or jogging, swimming, dance or martial arts, hunting and sports or recreation activities that is done at a moderate pace. Activity between 3 and 6 METs.

Vigorous-intensity: On a scale relative to an individual's personal capacity, vigorous-intensity physical activity is usually a 7 or 8 on an RPE scale of 0–10 (Annex 1). Examples include activities where it is "tricky to hold a conversation" while doing them i.e. sprinting, high-intensity interval training, climbing stairs, competitive sports like football, tennis, netball, or basketball. Activity that is performed at 6.0 or more METS.

Muscle-strengthening activities: Physical activity and exercises that increase skeletal muscle strength, power, endurance, and mass (e.g. strength training, resistance training, or muscular strength and endurance exercises). Examples include: push-ups and sit-ups, lifting weights, circuit training, calisthenics, working with resistance bands, heavy gardening or hunting.

Movement behaviour: Any bodily movement or lack thereof across the full 24-hour day, including physical activity, sedentary behaviour, and sleep.

Physical activity: Any bodily movement generated by skeletal muscles that results in energy expenditure above resting levels. Physical activity can be participated in at different intensities (light, moderate and vigorous) and in different domains (occupational, travel, household, leisure [sport, recreation and exercise]).

Rating of Perceived Exertion (RPE): See Annex 1

Recreational screen time: Time spent watching screens (television (TV), computer, mobile devices) for purposes other than those related to education/study or work.

Sedentary screen time: Time spent watching screen-based entertainment (TV, computer, mobile devices). Does not include active screen-based games where physical activity or movement is required.

Sedentary behaviour: Any waking behaviour characterised by an energy expenditure of 1.5 METS or lower while sitting, reclining, or lying. Most desk-based office work, driving a car, and watching television are examples of sedentary behaviours; these can also apply to those unable to stand, such as wheelchair users. The guidelines operationalise the definition of sedentary behaviour to include self-reported low movement sitting (leisure time, occupational, and total), television (TV viewing or screen time, and low levels of movement measured by devices that assess movement or posture).

Sleep hygiene: refers to behaviours and habits that promote healthy and restful sleep.

These behaviours include:

- Minimising caffeine intake.
- Limiting alcohol intake.
- Avoiding smoking cigarettes (nicotine).
- Spending time outdoors for natural light exposure, especially immediately after waking in the morning.
- Minimising light from electronic screens such as computers and smartphones after sunset. Being active.
- Physical activity improves the quality of sleep.
- Using the bed only for sleep (and sex) to strengthen the association between the bed as a place for rest. Creating a dark, quiet, and comfortable sleep environment. Using naps to help attain sufficient sleep, but avoiding napping for too long during the day as this can make it more difficult to fall asleep at night.

Note: Shift workers need tailored advice due to the timing and patterning of their sleep being different due to work schedules. See the Australian consensus guidelines on Healthy Sleep

Practices for Shift Workers: https://www.sleephealthfoundation.org.au/sleep-topics/healthy-sleep-practices-for-shift-workers

Standing: An upright posture with limited movement.

Australian 24-Hour Movement Guidelines for Adults (18-64 years) and Older Adults (65+ years)

Adults (18-64 years):

Preamble

These guidelines aim to help people improve their health and wellbeing through movement by recommending a balance of physical activity, sedentary behaviour, and adequate sleep across each 24-hour day. This document is meant for policy makers, health professionals, and researchers, but may also be useful to members of the public.

These guidelines apply to most apparently healthy adults (aged 18-64 years) across gender, cultural and language background, location, and socio-economic status.

Most adults will benefit from an active lifestyle with a daily balance of physical activities, sedentary behaviours and sleep for overall health. Adults who are pregnant or persons with disability or a chronic health condition should consult specific guidelines for these populations, or a health professional for guidance.

Adults aged 18-64 should participate in a range of physical activities across different settings (e.g. home/work/education/community; indoors/outdoors; land/water) and for different purposes (e.g. recreation; sport; active travel; hobbies; work). Excessive or prolonged sedentary behaviour (i.e. extended periods of sitting or lying with minimal movement) should be limited. Adults aged 18-64 should prioritise sufficient sleep by establishing routines, behaviours, and environments that support good sleep.

Following these guidelines is associated with a lower risk of mortality, type 2 diabetes, some cancers, accidents and injuries, and with healthier body composition, improved cardiovascular and metabolic health, mental health and quality of life. While meeting the 24-hour movement guidelines may be challenging at times, the benefits far exceed potential harms.

These guidelines were informed by the best available evidence on benefits and harms, expert consensus, stakeholder consultation, and consideration of values and preferences, acceptability, feasibility, resource use (cost), and equity.

Recommendations

For health benefits, it is recommended that adults aged 18-64 years be physically active, limit sedentary behaviour, and obtain sufficient sleep each day.

A healthy 24-hours includes:

Physical activity

A variety of physical activities at different intensities, which can include:

- Moderate- to vigorous-intensity physical activities for 30-minutes or more on most days, such that there is an accumulation of 2.5 hours or more per week. (*Strong recommendation, moderate certainty evidence*)
- Muscle strengthening activities at moderate or greater intensity that involve all main muscle groups on 2 or more days per week. (*Strong recommendation, low certainty evidence*).
- Functional activities that target mobility, balance, and coordination on 3 or more days per week. *(Strong recommendation, very low certainty evidence)*
- Several hours of light-intensity physical activity per day (*Strong recommendation, low certainty evidence)*

Sedentary Behaviour

- Limiting the amount of time spent being sedentary. (*Strong recommendation, moderate certainty evidence*)
- Breaking up prolonged periods of sedentary behaviour as often as possible. (Strong *recommendation, low certainty evidence*)

Sleep

- Getting 7-9 hours of good quality sleep, with consistent bed and wake-up times (Sleep duration: *Strong recommendation, low certainty evidence*) *(*Sleep timing*: Strong recommendation very low certainty evidence)*

Integrated

- Replacing sedentary behaviour with physical activity of any intensity, while obtaining sufficient sleep, can provide greater health benefits. Trading light-intensity physical activity for more moderate- to vigorous-intensity physical activity, while obtaining sufficient sleep, can also provide greater health benefits. (*Strong recommendation, very low certainty evidence*)

Note 1: For those not currently meeting these 24-hour movement guideline recommendations, progressing towards meeting any of the recommendations will result in some health benefits.

Note 2: Some physical activities can count towards multiple recommendations. For example, walking up and down stairs contributes to both your moderate-intensity activity and functional activity recommendations.

Companion Statements

These companion statements provide practical guidance on how to meet the recommendations. They combine evidence-based information with good practice principles to help in applying the recommendations. While the recommendations focus on ‘what’ to do, these statements help explain ‘how’ to do it.

Physical activity:

- Start by doing small amounts of physical activity, and gradually increase the frequency, intensity and/or duration over time.
- Any physical activity can be counted towards the totals.
- Tracking daily activity can be a useful way to set goals and monitor progress. This could include monitoring steps or recording time spent in different activities. For those who are able and track daily steps, aim for 7,000 or more steps per day.

Sedentary behaviour

- Replace sedentary behaviour (including recreational screen time) with any physical activity.
- Reduce or have regular breaks from prolonged periods of being sedentary.
- Standing, for those who are able, may serve as a practical transition from sedentary behaviour to more active options.

Sleep

- Allow enough time in bed for sufficient sleep. Sleep duration refers to hours of sleep attained, which is shorter than the time spent in bed.
- Good quality sleep refers to sleep that feels refreshing and minimises sleepiness during waking hours. Brief awakenings during the night are a part of normal sleep. Consistent bed/wake times will assist in achieving sufficient sleep.

Older Adults (65+ years)

Preamble

These guidelines aim to help people improve their health and wellbeing through movement by recommending a balance of physical activity, sedentary behaviour, and adequate sleep across each 24-hour day. This document is meant for use by policy makers, health professionals, and researchers, but may also be useful to members of the public.

These guidelines apply to most apparently healthy adults aged 65 years or older across gender, cultural and language background, location, and socio-economic status.

Most adults aged 65 years or older will benefit from an active lifestyle with a daily balance of physical activities, sedentary behaviours and sleep for overall health. Adults with disability or a chronic health condition should consider consulting specific guidelines for these populations, or a health professional for guidance.

Adults aged 65 years or older should participate in a range of physical activities across different settings (e.g. home/work/education/community; indoors/outdoors; land/water) and for different purposes (e.g. recreation; sport; active travel; hobbies; work). Excessive or prolonged sedentary behaviour (i.e. extended periods of sitting or lying with minimal movement) should be limited. Adults aged 65 years or older should prioritise sufficient sleep by establishing routines, behaviours, and environments that support good sleep.

Following these guidelines is associated with a lower risk of mortality, type 2 diabetes, some cancers, accidents and injuries and falls, and with healthier body composition, cardiovascular and metabolic health, blood lipid profile, blood pressure, mental health, quality of life, and physical and cognitive function. While meeting all these 24-hour movement guidelines may be challenging at times the benefits far exceed potential harms.

These guidelines were informed by the best available evidence on benefits and harms, expert consensus, stakeholder consultation, and consideration of values and preferences, acceptability, feasibility, resource use (cost), and equity.

Recommendations

For health benefits, it is recommended that adults aged 65 years or older be physically active, limit sedentary behaviour and obtain sufficient sleep each day.

A healthy 24-hours includes:

Physical activity

A variety of physical activities at different intensities, which can include:

- Moderate- to vigorous-intensity physical activities for 30-minutes or more on most days, such that there is an accumulation of 2.5 hours or more per week. (*Strong recommendation, moderate certainty evidence*)
- Muscle-strengthening activities at moderate or greater intensity that involve all main muscle groups on 2 or more days per week. (*Strong recommendation, low certainty evidence*)
- Functional activities that target mobility, balance, and coordination on 3 or more days per week. *(Strong recommendation, low certainty evidence)*
- Several hours of light-intensity physical activity per day. (*Strong recommendation, low certainty evidence)*

Sedentary Behaviour

- Limiting the amount of time spent being sedentary. (*Strong recommendation, moderate certainty evidence*)
- Breaking up prolonged periods of sedentary behaviour as often as possible. (*Strong recommendation, low certainty evidence*)

Sleep

- Getting 7-8 hours of good quality sleep, with consistent bed and wake-up times (Sleep Duration: *Strong recommendation, low certainty evidence*) *(*Sleep timing*: Strong recommendation very low certainty evidence)*

Integrated

- Replacing sedentary behaviour with physical activity of any intensity, while obtaining sufficient sleep, can provide greater health benefits. Where possible, trading light-intensity physical activity for more moderate- to-vigorous-intensity physical activity, while obtaining sufficient sleep, can also provide greater health benefits. (*Strong recommendation, very low certainty of evidence*)

Note 1: For those not currently meeting these 24-hour movement guideline recommendations, progressing towards meeting any of the recommendations will result in some health benefits.

Note 2: Some physical activities can count towards multiple recommendations. For example, walking up and down stairs contributes to both your moderate-intensity activity and functional activity recommendations.

Companion Statements

These companion statements provide practical guidance on how to meet the recommendations. They combine evidence-based information with good practice principles to help in applying the recommendations. While the recommendations focus on ‘what’ to do, these statements help explain ‘how’ to do it.

Physical activity

- Start by doing small amounts of physical activity, and gradually increase the frequency, intensity and/or duration over time.
- Any physical activity can be counted towards the totals.
- Tracking daily activity can be a useful way to set goals and monitor progress. This could include monitoring steps or recording time spent in different activities. For those who are able and track daily steps, aim for 7,000 or more steps per day.

Sedentary behaviour

- Replace sedentary behaviour (including recreational screen time) with any physical activity.
- Reduce or have regular breaks from prolonged periods of being sedentary.
- Standing, for those who are able, may serve as a practical transition from sedentary behaviour to more active options.

Sleep

- Allow enough time in bed for sufficient sleep. Sleep duration refers to hours of sleep attained, which is shorter than the time spent in bed.
- Good quality sleep refers to sleep that feels refreshing and which minimises sleepiness during waking hours. Brief awakenings during the night are a part of normal sleep. Consistent bed/wake times will assist in achieving sufficient sleep.

Adults and Older Adults with Disability

Preamble

These guidelines aim to help people improve their health and wellbeing through movement by recommending a balance of physical activity, sedentary behaviour, and adequate sleep across each 24-hour day. This document is meant for policy makers, health professionals, and researchers, but may also be useful to members of the public.

These guidelines apply to most adults (aged 18 years or older) with various disabilities, across gender, cultural and language background, location, and socio-economic status.

Most adults with disability are likely to benefit from an active lifestyle with a daily balance of physical activities, sedentary behaviours and sleep for overall health.

Adults with disability can engage in a variety of physical activities across different settings (e.g. home/work/education/community; indoors/outdoors; land/water) and for different purposes (e.g. recreation, sport, active travel, hobbies, work, rehabilitation). Excessive or prolonged sedentary behaviour (i.e. extended periods of sitting or lying with minimal movement) should be limited. Adults with disability should prioritise sufficient sleep by establishing routines, behaviours, and environments that support good sleep.

Following these guidelines is associated with a lower risk of death, comorbid conditions, and disease progression/recurrence, and better physical function/pain management, and health-related quality of life. All adults with disability should try to meet these recommendations where possible and as able, unless they have important contraindications. While meeting all the 24-hour movement guidelines may be challenging, the benefits exceed potential harms for most people.

These guidelines were informed by the best available evidence on benefits and harms for people with the following conditions: intellectual disabilities, spinal cord injury, Multiple Sclerosis, Parkinson’s disease, stroke, frailty, hip fracture, moderate to severe traumatic brain injury and mixed disabling conditions; as well as expert consensus, stakeholder consultation and consumer focus groups, and consideration of values and preferences, acceptability, feasibility, resource use (cost), and equity. These conditions were prioritised because of their prevalence and the direct impact that physical activity, sedentary behaviour and/or sleep are shown to have on these conditions in the literature.

Recommendations

For health benefits, it is recommended that adults and older adults with disability aged 18 years and older be physically active, limit sedentary behaviour, and obtain sufficient sleep each day.

A healthy 24-hours includes:

Physical Activity

Doing different kinds of physical activities at various intensities regularly, including:

- Moderate-to vigorous-intensity physical activities for 30-minutes or more on most days, such that there is an accumulation of 2.5 hours or more per week. (*Strong recommendation, low certainty evidence*)
- Muscle-strengthening activities at moderate or greater intensity that involve all main muscle groups on 2 or more days per week. (*Strong recommendation, low certainty evidence*)
- Functional activities that target mobility, balance, and coordination on 3 or more days per week. *(Strong recommendation, low certainty evidence)*
- Several hours of light-intensity physical activity per day. (*Strong recommendation, very low certainty evidence)*

Sedentary behaviour

- Limiting the amount of time spent being sedentary. (*Strong recommendation, very low certainty evidence)*
- Breaking up prolonged periods of sedentary behaviour as often as possible. (Conditional *recommendation, very low certainty evidence*)

Sleep

- Getting sufficient, good quality sleep, with consistent bed and wake-up times. (*Conditional recommendation, very low certainty evidence*)

Integrated

- Replacing sedentary behaviour with physical activity of any intensity, while obtaining sufficient sleep, can provide greater health benefits. Trading light-intensity physical activity for more moderate- to vigorous-intensity physical activity, while obtaining sufficient sleep, can also provide greater health benefits. (*Conditional recommendation, very low certainty evidence*)

Note 1: For those not currently meeting these 24-hour movement guideline recommendations, progressing towards meeting any of the recommendations will result in some health benefits.

Note 2: Some physical activities can count towards multiple recommendations. For example, stair climbing can contribute to both moderate-intensity activity and functional activity recommendations.

Companion Statements

These companion statements provide practical advice on how to meet the guideline recommendations. They combine evidence-based information with good practice principles to help in applying the recommendations. While the recommendations focus on ‘what’ to do, these statements help explain ‘how’ to do it.

Physical activity:

Start slowly and build up if possible

- Start by doing small amounts of physical activity and, if possible, gradually increase the frequency, intensity, and duration over time.
- Tracking daily activity can be a useful way to set goals and monitor progress. This could include monitoring steps or recording time spent in different activities.

Professional help may be needed

- Pre-exercise medical clearance is generally not required for individuals without contraindications prior to becoming more physically active.
- Consider consulting a health professional and/or physical activity specialist for advice on appropriate types and amounts of activity.
- Additional support (e.g. transport, equipment, assistance) may be required to help some people to safely be active according to their needs, abilities and preferences.

Sedentary behaviour

- Replace sedentary behaviour (including recreational screen time) with any physical activity.
- Reduce or have regular breaks from prolonged periods of being sedentary.
- Standing, for those who are able, may serve as a practical transition from sedentary behaviour to more active options.

Sleep

- Allow enough time in bed for sufficient sleep. Sleep duration refers to hours of sleep attained, which is shorter than the time spent in bed.
- Good quality sleep refers to sleep that feels refreshing and which reduces sleepiness during waking hours. Brief awakenings during the night are a part of normal sleep. Consistent bed/wake times will assist in achieving sufficient sleep.

Adults and Older Adults with Chronic Conditions

Preamble

These guidelines aim to help people improve their health and wellbeing through movement by recommending a balance of physical activity, sedentary behaviour, and adequate sleep across each 24-hour day. This document is meant for policy makers, health professionals, and researchers, but may also be useful to members of the public.

These guidelines apply to most adults (aged 18 years or older) with various chronic conditions, across gender, cultural and language background, location, and socio-economic status.

Most adults with chronic conditions are likely to benefit from an active lifestyle with a daily balance of physical activities, sedentary behaviours and sleep for overall health.

Adults with chronic conditions can engage in a variety of physical activities across different settings (e.g. home/work/education/community; indoors/outdoors; land/water) and for different purposes (e.g. recreation, sport, active travel, hobbies, work, rehabilitation). Excessive or prolonged sedentary behaviour (i.e. extended periods of sitting or lying with minimal movement) should be limited. Adults with chronic conditions should prioritise sufficient sleep by establishing routines, behaviours, and environments that promote good sleep.

Following these guidelines is associated with a lower risk of death, comorbid conditions, and disease progression/recurrence, and better physical function/pain management, and health-related quality of life. All adults aged 18 years or older with chronic conditions should try to meet these recommendations where possible and as able, unless they have important contraindications. While meeting all the 24-hour movement guidelines may be challenging, the benefits exceed potential harms for most people.

These guidelines were informed by the best available evidence on benefits and harms for people with the following health conditions: type 2 diabetes, cardiovascular disease (excluding stroke), hypertension, chronic lung conditions, osteoarthritis, osteoporosis, cancer, major depression disorder, anxiety and stress-related disorders, and dementia; as well as expert consensus, stakeholder consultation and consumer focus groups, and consideration of values and preferences, acceptability, feasibility, resource use (cost), and equity. These conditions were prioritised because of their prevalence and the direct impact that physical activity, sedentary behaviour and/or sleep are shown to have on these conditions in the literature.

Recommendations

For health benefits, it is recommended that adults and older adults with chronic conditions aged 18 years and older be physically active, limit sedentary behaviour, and obtain sufficient sleep each day.

A healthy 24-hours includes:

Physical activity

Doing different kinds of physical activities at various intensities regularly, including:

- Moderate- to vigorous-intensity physical activities for 30-minutes or more on most days, such that there is an accumulation of 2.5 hours or more per week. (*Strong recommendation, moderate certainty evidence*)
- Muscle-strengthening activities at moderate or greater intensity that involve all main muscle groups on 2 or more days per week. (*Strong recommendation, moderate certainty evidence*)
- Functional activities that target mobility, balance, and coordination on 3 or more days per week. *(Strong recommendation, low certainty evidence)*
- Several hours of light-intensity physical activity per day. (*Strong recommendation, very low certainty evidence)*

Sedentary Behaviour

- Limiting the amount of time spent being sedentary. (*Strong recommendation, very low certainty evidence*)
- Breaking up prolonged periods of sedentary behaviour as often as possible. (*Conditional recommendation, very low certainty evidence*)

Sleep

- Getting sufficient, good quality sleep, with consistent bed and wake-up times (*Conditional recommendation, very low certainty evidence*)

Integrated

- Replacing sedentary behaviour with physical activity of any intensity, while obtaining sufficient sleep, can provide greater health benefits. Trading light-intensity physical activity for more moderate- to vigorous-intensity physical activity, while obtaining sufficient sleep, can also provide greater health benefits. (*Conditional recommendation, very low certainty evidence*)

Note 1: For those not currently meeting these 24-hour movement guideline recommendations, progressing towards meeting any of the recommendations will result in some health benefits.

Note 2: Some physical activities can count towards multiple recommendations. For example, stair climbing can contribute to both moderate-intensity activity and functional activity recommendations.

Companion Statements

These companion statements provide practical advice on how to meet the guideline recommendations. They combine evidence-based information with good practice principles to help in applying the recommendations. While the recommendations focus on ‘what’ to do, these statements help explain ‘how’ to do it.

Physical activity

- Start slowly and build up if possible
- Start by doing small amounts of physical activity and, if possible, gradually increase the frequency, intensity, and duration over time.
- Tracking daily activity can be a useful way to set goals and monitor progress. This could include monitoring steps or recording time spent in different activities.

Professional help may be needed

- Pre-exercise medical clearance is generally not required for individuals without contraindications prior to becoming more physically active.
- Consider consulting a health professional and/or physical activity specialist for advice on appropriate types and amounts of activity
- Additional support (e.g. transport, equipment, assistance) may be required to help some people to safely be active according to their needs, abilities and preferences.

Sedentary behaviour

- Replace sedentary behaviour (including recreational screen time) with any physical activity.
- Reduce or have regular breaks from prolonged periods of being sedentary.
- Standing, for those who are able, may serve as a practical transition from sedentary behaviour to more active options.

Sleep

- Allow enough time in bed for sufficient sleep. Sleep duration refers to hours of sleep attained, which is shorter than the time spent in bed.
- Good quality sleep refers to sleep that feels refreshing and which reduces sleepiness during waking hours. Brief awakenings during the night are a part of normal sleep. Consistent bed/wake times will assist in achieving sufficient sleep.

Background and Rationale

In May 2023, the Australian Government provided funding to update the Australian Physical Activity Guidelines and Australian Sedentary Behaviour Guidelines for Adults and Older Adults, to be an integration of movement behaviours across the 24-hour period, consistent with the Australian 24-hour Movement Guidelines for Children, Young People and the Early Years (1). The potential benefit for Australia was that it could leverage the considerable work done in Canada on the development of their 24-hour guidelines, which would allow Australia to complete what would normally be a much longer process, in considerably less time and requiring fewer resources. The GRADE-ADOLOPMENT approach allows guideline developers to follow a well-accepted and transparent process for developing guidelines (GRADE) in an efficient manner by adapting or adopting an existing evidence-based guideline (2). This could potentially prevent the need to undertake (or repeat) costly tasks such as conducting full systematic reviews. At the same time, it allows local guideline developers to take into consideration factors that are specific to their local context.

Based on the Canadian Guideline Development Panel's approach to develop the *Canadian 24-Hour Movement Guidelines for Adults and Older Adults*, and the successful use of the GRADE-ADOLOPMENT approach to develop the Australian 24-hour Movement Guidelines for Children, Young People and the Early Years (1), the Guideline Development Group decided to use the GRADE-ADOLOPMENT approach to develop the *Australian 24-Hour Movement Guidelines for Adults and Older Adults*. This Guideline Development Report outlines the process and outcomes to develop the *Australian 24-Hour Movement Guidelines for Adults and Older Adults*.

These recommendations were based on the best available evidence and have included, for the first time, specific guidelines for adults and older adults living with disabilities and those living with chronic disease. The recommendations have also considered Aboriginal and Torres Strait Islander people as a priority population.

The current older Australian adults 'Choose Health: Be Active' guidelines were most recently revised in 2008; the current Australian adult guidelines were released in 2014. Since this time there have been many societal shifts, particularly regarding the use of technology and changes in occupational settings. Greater awareness of the importance of integrating sedentary behaviours and sleep hygiene into public health messaging is needed. The current Australian recommendations for adults and older adults do not adequately cater for these changes. Accordingly, many professional organisations have begun to incorporate sedentary behaviour into physical activity guidelines using a 24-hour movement approach.

A key feature is the incorporation of the 24-hour movement behaviour approach, an approach used to modernise the current 24-hour movement guidelines for birth to 5 years, and 24-hour movement guidelines for children and young people. As such, Australia now has a complete 'suite' of 24-hour movement behaviour guidelines across the lifespan.

Management of guideline development process

Guideline Development Group

The Guideline Development Group included experts in the areas of physical activity, sedentary behaviour, and sleep in adults and older adults, including adults living with disability, adults living with chronic conditions, and Aboriginal and Torres Strait Islander people. The members of the Guideline Development Group are listed in Annex 2.
The Guideline Development Group drafted the scope of the guidelines and PICOs (Population, Intervention, Comparator, and Outcome), reviewed the declaration of interests, drafted, reviewed and finalised the guidelines. The group agreed on the process for decision-making on recommendations and the strength of the evidence and certainty ratings to be applied. Sub-committees were formed to oversee stakeholder consultation, and communication and dissemination activities.

Guideline Consensus Panel

The Guideline Consensus Panel consisted of the Development Group members and representatives from 25 key stakeholder organisations. Stakeholder organisations were representative of priority consumer groups, professionals who would be end users of the guidelines, state and federal government, as well the health, transport and sports sectors. The members of the Guideline Consensus Panel are listed in Annex 3.

The Guideline Consensus panel reviewed the findings from the completed evidence update and agreed on the GRADE-ADOLOPMENT(2) of the Canadian guidelines(3).

Declarations of Affiliations and Interests

All Guidelines Consensus Panel members completed and submitted a form titled *Declaration of Affiliations and Interests Form and Checklist*. This was completed prior to the Consensus Panel meeting to ensure transparency, and circulated to all Guidelines Consensus Panel members to review which provided an opportunity to determine whether an individual should remove themselves at a point in time where it was considered a conflict of interest. A summary of declarations of interest are provided in Annex 4.

Evidence to recommendations

In accordance with the GRADE process (4), the Guideline Development Group considered the proposed wording of the recommendations and the rating of its strength (strong or conditional). This took into consideration not just the nature and quality of evidence but an assessment of peoples' values and preferences, the balance between benefits and harms, and the impact of the recommendation on gender, sex, social and health equity, as well as the acceptability, feasibility and resource implications (5). Decisions were reached by consensus.

Assessment of the certainty of evidence

Using the GRADE framework, the Guideline Development Group examined the certainty of evidence contributing to each outcome identified in the PICOs and assessed the overall

certainty in the body of evidence. This assessment took into consideration the risk bias, consistency, precision, directness of the evidence and publication bias across each outcome, along with dose-response effects, the size of the effect and residual confounding (6). GRADE tables detailing this information for each PICO are available in Evidence Annexes 1, 2 and 3.

Values and Preferences

In developing the Australian 24-Hour movement guidelines for adults and older adults, online surveys were open to members of the public and stakeholders and focus group discussions were held including those from priority populations; people living with disability or chronic health conditions, people from a culturally and linguistically diverse background, and Aboriginal and Torres Strait Islander people. These sources of information were used to help determine the values and preferences i.e. the importance people place on the health outcomes, in addition to expert knowledge from the Guideline Consensus Panel.

The surveys and focus groups were conducted to assess the understanding of the draft guidelines and to gather feedback on preferred wording. This information guided the finalisation of the technical guidelines and supporting companion statements and to inform the dissemination and communication strategies for the proposed next phase.

Supporting conditions for implementation

In total, 77% percent of respondents to the Australian stakeholder surveys on the integrated 24-hour movement guidelines for adults and older adults believed the benefits outweighed the costs and 68% felt the cost to use or implement the guidelines would be minimal.

In the view of the Guideline Development Group, the potential health benefits of meeting all the recommendations outweighed the health costs. In some settings there may be additional resource requirements (e.g. transport, equipment, assistance) to ensure some people meet all recommendations, particularly for older adults, and people living with disability and chronic conditions.

Acceptability and feasibility

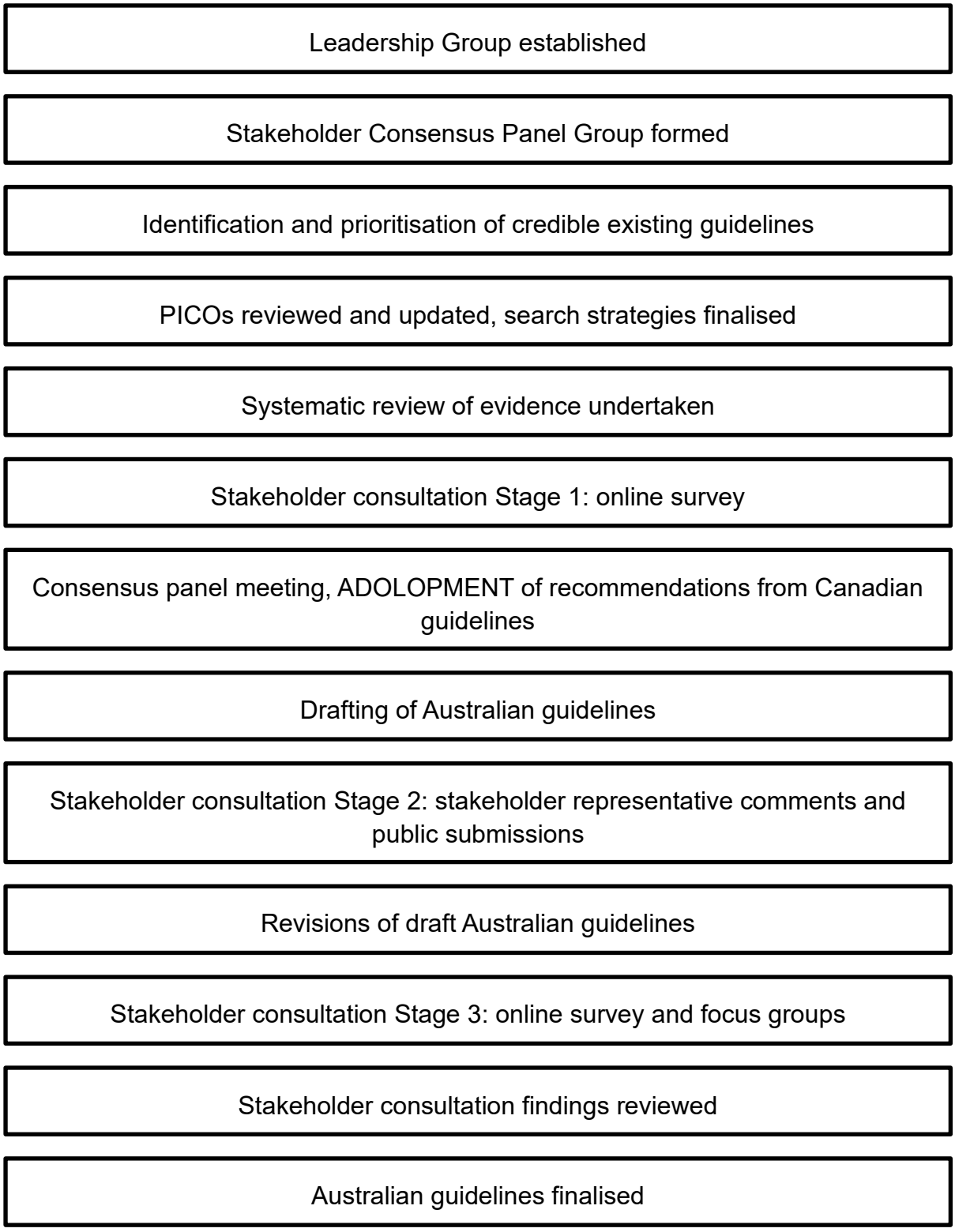
Feedback obtained from the national pre-engagement survey on the preferred guidelines from the GRADE-ADOLOPMENT process (the Canadian 24-hour Movement Guidelines for Adults and Older Adults) were considered by the Guideline Development Group when discussing feasibility and acceptability of the recommendations. The majority of respondents (80.6%) thought that integrated 24-hour movement guidelines were more useful compared to traditional “stand-alone” physical activity guidelines.

Updating

These guidelines are recommended to be updated every 10 years, unless advances in the science of how physical activity is assessed using device-based measurement, and the rapidly evolving science on sedentary behaviour, prompt an earlier update.

Timeline for the Project

Figure 1. Timeline and sequence of events involved in the development of the Australian 24-hr movement guidelines for Adults and Older Adults



Scope and purpose of guideline

The overall goals of this guideline were to provide recommendations on the amount of time adults and older adults should spend being physically active, sedentary, and sleeping for their health and wellbeing. This technical document is intended for use by policy makers, health professionals, and researchers, and it may be useful to members of the public.

Scope of guideline and PICO questions

The Guideline Development Group reviewed the existing international physical activity guidelines for adults and older adults. Each recommendation was assessed to determine if it met the following criteria:

- Followed the Grading of Recommendations, Assessment, Development and Evaluation (GRADE) process
- Addressed clear questions (can identify Population, Intervention, Comparator, and Outcome (PICO) elements)
- Had benefits and harms assessments
- Used the Appraisal of Guidelines for Research & Evaluation (AGREE) for assessment
- Allowed for updating
- Had existing and accessible evidence tables/summaries
- Had risk of bias assessment
- Had integrated recommendations (i.e. included all movement behaviours over the 24-hour period)
- Presented costs associated with implementing guideline
- Had accompanying information on planned implementation and dissemination of the guidelines

A total of 13 existing international guidelines were identified at the time of project commencement, (Annex 5). The Guideline Development Group determined that the Canadian guidelines were the most appropriate guidelines to use in the ADOLOPMENT process in the development of the sleep, sedentary behaviour and integrated recommendations for adults and older adults, as they were the only guidelines to meet the key criteria of using an integrated (24-hour) approach, having a risk of bias assessment, and allowing for updating by having accessible evidence summary documents (3). Physical activity recommendations for adults and older adults used the 2020 World Health Organisation (WHO) evidence reviews to update, as the Canadian 24-h guidelines had leveraged the 2018 US Scientific Report (7); with WHO providing the most recent evidence to update. As populations with disability or chronic conditions had not been included in the scope of the Canadian guidelines, The Guideline Development Group agreed to use the WHO guidelines for physical activity in these populations (8) also drawing on some evidence reviews completed in the 2018 US Scientific Report.

The primary evidence-base in adults aged 18 and over was used to inform conditional recommendations for sleep, integrated behaviours and sedentary behaviour patterns for adults with disability and adults with chronic conditions. The PICOs used in the Canadian

and WHO guidelines were reviewed and the group agreed on some minor amendments that were relevant to the Australian context (Evidence Annexes 1, 2 and 3).

Evidence reviews

The group then determined to undertake an update of the systematic reviews, umbrella reviews and overviews of reviews completed in the development of the Canadian and WHO guidelines, including de novo systematic reviews for exposures/outcomes of interest where an existing up to date review was not identified. A summary of the reviews undertaken for each movement behaviour, in each population, has been included in table 1 and 2.

Table 1: Summary of evidence reviews undertaken for adults and older adults

Movement Behaviour	Guideline	Type of review to be updated	Type of studies included in the update
Physical activity	WHO	umbrella review	systematic reviews
Sedentary Behaviour	Canada & WHO	Overview of reviews, umbrella review	systematic reviews
Sleep duration	Canada	Overview of reviews	systematic reviews
Sleep timing and consistency	Canada	systematic review of primary studies	primary studies
Integrated	Canada	systematic review of primary studies	primary studies
Steps	–	De novo review conducted	primary studies

Table 2: Summary of evidence reviews undertaken for adults and older adults with disability or chronic conditions

Movement Behaviour	Guideline	Type of review to be updated	Type of studies included in the update
Physical activity	WHO & USA	umbrella review	systematic reviews
Physical activity*	–	De novo review conducted	systematic reviews
Sedentary Behaviour	–	De novo review conducted	systematic reviews

* populations with conditions that were not captured in previous guidelines

In addition to the above, separate searches were carried out to identify published literature (systematic reviews and primary studies) on physical activity, sedentary behaviour and sleep specifically in Aboriginal and Torres Strait Islander populations.

Literature searches, screening for eligibility, assessment of quality, evidence synthesis and GRADE evaluation were undertaken from December 2023 and were completed by December 2024.

Rating of the Evidence

Definitions for ratings of the certainty of the evidence

Ratings	Definitions
High	This research provides a very good indication of the likely effect. The likelihood that the effect will be substantially different is low.
Moderate	This research provides a good indication of the likely effect. The likelihood that the effect will be substantially different is moderate.
Low	This research provides some indication of the likely effect. However, the likelihood that it will be substantially different (a large enough difference that it might have an effect on a decision) is high.
Very Low	This research does not provide a reliable indication of the likely effect. The likelihood that the effect will be substantially different (a large enough difference that it might have an effect on a decision) is very high.

GRADE-ADOLOPMENT of existing guidelines

The Guideline Development Group decided that for outcomes that had an existing review that was updated, the final rating of the certainty of the evidence was based on that from the source guideline, supplemented with updated evidence. In cases where the original guideline strength of evidence rating is higher than the new evidence found, we kept the evidence rating the same as the source guidelines unless convincing new evidence suggested otherwise. In cases where the strength of evidence rating in the updated search was higher than that from the source guideline, we updated the rating to reflect the newer rating. This has been detailed in Evidence Annexes 1, 2 and 3.

Dissemination, implementation and evaluation

The goal of these guidelines is to provide health professionals, policymakers and the public with recommendations on how much time adults and older adults should spend each day being physically active and sleeping and recommendations on the maximum time people should spend being sedentary. Dissemination of these guidelines in a manner that is accessible and understandable is key to raise awareness, educate, change attitudes and support behaviour change in the community. With achievement of the objectives, short-term awareness, knowledge, behaviour change, and health benefits are expected. It is recommended that the guidelines developed in this report be disseminated to the general public in ways that make them as easy to understand and implement according to their needs. For suggestions on communication, dissemination, implementation and integration planning, please refer to the section on Page 84.

GRADE Evidence-to-Decision Frameworks

Adults (18 – 64 years)

Physical activity recommendations

For health benefits, it is recommended that adults aged 18-64 years be physically active, limit sedentary behaviour, and obtain sufficient sleep each day. A healthy 24-hours includes:

Physical activity

A variety of physical activities at different intensities, which can include:

- Moderate- to vigorous-intensity physical activities for 30-minutes or more on most days, such that there is an accumulation of 2.5 hours or more per week. (*Strong recommendation, moderate certainty evidence*)
- Muscle strengthening activities at moderate or greater intensity that involve all main muscle groups on 2 or more days per week. (*Strong recommendation, low certainty evidence*)
- Functional activities that target mobility, balance, and coordination on 3 or more days per week. *(Strong recommendation, very low certainty evidence)*
- Several hours of light-intensity physical activity per day. (*Strong recommendation, low certainty evidence)*

Question

What is the association between physical activity and health-related outcomes in adults?

- Is there a dose-response association (volume, duration, frequency, intensity)?
- Does the association vary by type or domain of physical activity?

Methods

The methods and search strategies were prospectively registered in PROSPERO (CRD42024526038).

Summary and quality of evidence

Moderate- to vigorous-intensity physical activity (MVPA)

Eight systematic reviews published from May 2019 to December 2023 met inclusion criteria and were included in the evidence-to-decision framework. Higher levels of MVPA lowered the risk of all-cause mortality, Cardiovascular disease (CVD) mortality and incidence, cancer mortality and incidence of some cancers (breast, colon, lung), and mental health outcomes, with a dose-response observed for all outcomes aside from cancer incidence and mental health. No updated evidence was found examining the association between MVPA and type 2 diabetes incidence, since the WHO review which found mixed effects. There was a lack of evidence for the association between MVPA and kidney, prostate or rectal cancer.

For the critical outcomes, there was moderate to high-certainty evidence for all-cause mortality and mental health outcomes, low to moderate certainty evidence for CVD mortality and very low-certainty evidence for CVD incidence, cancer mortality and incidence.

Additional considerations

The association between MVPA and mortality and chronic disease outcomes generally follow an 'L' shape dose-response relationship, meaning that the largest amounts of risk reduction are often observed when someone moves from doing nothing to doing something. Therefore, it is important to start with a qualitative recommendation highlighting the importance of being active regardless of a quantitative goal. This message is further supplemented by the companion statement highlighting that doing something is better than doing nothing.

The Guideline Development Group discussed the inclusion of an upper threshold of 300 min/week of moderate-intensity physical activity or 150 min/week of vigorous-intensity physical activity (as per the WHO recommendation). The Guideline Development Group agreed that the current evidence update supports the existing WHO recommendations in terms of the quantitative goal (150-300 min/week), however, considers the current wording '150–300 minutes of moderate-intensity aerobic physical activity; or at least 75–150 minutes of vigorous-intensity aerobic physical activity' confusing. The current WHO Recommendation 2 is at risk of being misinterpreted as more than 300 min/week of moderate-intensity physical activity or more than 150 min/week of vigorous-intensity physical activity being harmful unless one reads Recommendation 4. The Canadian recommendation of at least 150 minutes of moderate-to-vigorous intensity physical activity is more concise and easily understood. The Guideline Development Group considers that it is not a substantial loss to drop the upper threshold of 300 min/week of moderate-intensity physical activity or 150 min/week of vigorous-intensity physical activity considering the 'diminishing returns on investments' for increasing the activity levels from the lower to the upper threshold based on the dose-response curves. (9)

Muscle-strengthening Activities (MSA)

One systematic review published in 2022 met the inclusion criteria and was included in the evidence-to-decision framework. Higher levels of MSA lowered the risk of all-cause mortality, CVD mortality and incidence, and lung cancer incidence. There was a lack of evidence for the association between a higher level of MSA and bladder, colon, kidney, or pancreatic cancer.

For the critical outcomes, there was moderate to high-certainty evidence for all-cause mortality and mental health outcomes, low to moderate certainty evidence for CVD mortality and very low-certainty evidence for CVD incidence, cancer mortality and incidence.

Functional Activities

Two systematic reviews, published in 2023 on outcomes specifically evaluated for adults between the age of 18-64 years of age met the inclusion criteria. In adults, functional training and strength training are associated with improved physical function (very low-certainty evidence).

Light-Intensity Physical Activity (LPA)

Three systematic reviews published from 2019 to 2023 met inclusion criteria and were included in the evidence-to-decision framework. Higher levels of LPA lowered the risk of all-cause and cancer mortality, a dose-response was observed for all-cause mortality. A higher level of LPA had mixed effects on CVD mortality.

For the critical outcomes, there was low-certainty evidence for CVD and cancer mortality and very low-certainty evidence for all-cause mortality.

Additional considerations

Inverse associations for the links between LPA and mortality outcomes (all-cause, CVD and cancer) (10-14) were identified from recent systematic reviews and meta-analyses, and it is clear that the amounts of LPA required for health benefits are much higher than those for MVPA (11, 12). For example, according to a harmonised meta-analysis, the optimal amount of MVPA for all-cause mortality was around 22 minutes per day but exceeded 300 minutes per day for LPA (15).

LPA tends to strongly correlate with total physical activity, however, such a correlation has not been optimally considered in existing evidence. There is an indication that accounting for the confounding of total physical activity (or MVPA) may affect the results. For example, a recent systematic review found an inverse association between LPA and CVD mortality, for every 30 min per day of LPA the risk of CVD mortality was lowered by 20% (12). However, after adjusting for MVPA, this association was no longer statistically significant (11). The Guideline Development Group suggests recommending a quantitative target for LPA as a large proportion of the day is spent engaged in LPA, given that this includes incidental activities.

Evidence summary tables are available in Evidence Annex 1.

Benefits vs Harms

There was no evidence of harm for MVPA, even at very high levels (16). There was also no evidence of harm for undertaking muscle strengthening activities, functional activities or light intensity activity. Therefore, benefits were determined to clearly outweigh harms.

Supporting conditions for implementation

The expert opinion of the Guideline Development Group, and a small body of evidence reporting on economic analyses of interventions and savings to the health care systems from increasing levels of physical activity, informed discussion on the resource implications of the recommendations in different settings. Results from the online public consultation showed that over 77% of respondents agreed or strongly agreed that the benefits of implementing the guidelines would outweigh the individual costs and 68% agreed or strongly agreed that the individual costs to use the guidelines are likely to be small or have little impact compared to not using the guidelines. Available evidence and expert opinion recognise that substantial health benefits can be achieved at low risk through activities that require no cost to the individual or specific equipment, such as walking. Evidence supports that substantial health savings are possible for the health care system resulting from increasing physical activity and limiting high levels of sedentary behaviour (17, 18, 19). Overall, the Guideline Development Group assessed that while there are resource

implications for implementation of actions to achieve these recommendations, it should be considered within current governance structures. Further, evidence supports that substantial health savings are possible for the health care system resulting from increasing levels of physical activity. In 2013 the global annual cost of physical inactivity was estimated at $78 billion due to direct health costs alone (20); and at a national level inactivity is estimated to cost between 1-3 % of health care budgets (21). Analysis of the cost and benefits of physical activity promotion indicate positive returns on investment over 15 years in terms of non-communicable disease prevention in many countries where the investment cases have been conducted.

Equity, ethics and human rights implications

In total, 79% of respondents to the online public consultation agreed or strongly agreed that implementing the guidelines can achieve a reduction in health inequity by increasing opportunities for all to be active and improve health outcomes. For reducing health inequality in implementing the recommendations, the Guideline Development Group noted the importance of ensuring that there are safe and supportive environments and opportunities for physical activity that are accessible for all, regardless of age, gender, sex, cultural background, socioeconomic status, health, disability, and other differences. The Guideline Development Group recommends different sectors, such as transportation, urban planning, community and sport, work together to improve equal access to physical activity opportunities and activity-friendly environments, and to reduce gender, sex, socioeconomic and cultural barriers to participating in physical activity. Compared with moderate-to-vigorous intensity physical activity, MSA may require certain levels of skills and physical literacy. This may lead to health inequality and should be considered in the implementation of the guidelines. Recommendations for persons with disability and chronic conditions are addressed in separate recommendations.

Acceptability, Values and Preferences

The Guideline Development Group concluded that there is little or no uncertainty about preferences regarding the critical outcomes. The estimated potential benefits of increasing physical activity greatly outweighed any potential harms. Given the above, the Guideline Development Group did not consider the decision to be preference-sensitive.

Feasibility and implementation considerations

Physical activity can be achieved at a low cost and does not require high-cost equipment. This may be particularly the case for LPA, as it can be accumulated through activities of daily living. Policies and infrastructure can facilitate the implementation of the physical activity guidelines.

Communication related to the guidelines should highlight the importance of muscle strengthening activities (MSA). Examples should be provided as a supplement to the guidelines to support dissemination and implementation to further explain what MSA entails, including examples of MSA without needing special equipment, such as push-ups and sit-ups. Activity-promoting environments and policies should be important components of implementation. In a national survey distributed in the development of the guidelines, 70.7% of stakeholders agreed that a statement on number of steps per day would be a useful

addition to the current physical activity recommendations. Considering the ubiquity of step-counting trackers and that many individuals can easily comprehend and prefer step-based metrics, it is important to offer a step-based target as part of the good practice statement for those who are capable of stepping and prefer using step-based targets. The Guideline Development Group led a systematic review with meta-analyses to synthesise the evidence on daily steps and multiple health outcomes (https://papers.ssrn.com/sol3/papers.cfm?abstract_id=5095117) and derived a 7,000 steps/day target based on the best available evidence. Evidence suggested that achieving less steps was also beneficial, but this target was based on the optimal threshold which ranged between 6000-9000 steps. While step counting is a useful way to monitor overall movement, this target measures total daily steps at any intensity and is separate from the recommendation for moderate- to vigorous-intensity physical activity, which specifically focuses on activities that raise your heart rate and breathing.

Sedentary behaviour recommendations

For health benefits, it is recommended that adults aged 18-64 years be physically active, limit sedentary behaviour, and obtain sufficient sleep each day. A healthy 24-hours includes:

Sedentary Behaviour

- Limiting the amount of time spent being sedentary. (*Strong recommendation, moderate certainty evidence*)
- Breaking up prolonged periods of sedentary behaviour as often as possible. (*Strong recommendation, low certainty evidence*)

Question

What is the relationship between different types of sedentary behaviour and health outcomes in adults?

- Does physical activity modify the effect of sedentary behaviour on mortality?

What is the relationship between patterns of sedentary time (bouts, breaks etc) and health indicators in adults?

Methods

The methods and search strategies were prospectively registered in PROSPERO (CRD42024516832).

Summary and quality of evidence

Eleven systematic reviews published from May 2019 to December 2023 met the inclusion criteria and were included in the evidence-to-decision framework. Higher levels of sedentary behaviour increased the risk of all-cause and cause-specific (CVD, cancer) mortality, endometrial cancer, and the levels of some cardiometabolic health markers, i.e. fasting insulin, HDL cholesterol, and systolic blood pressure. A dose-response was observed for all-cause and cause-specific mortality, and incidence of type 2 diabetes. There was a lack of evidence for the association between sedentary behaviour and levels of other cardiometabolic health markers (fasting glucose, HbA1c, total cholesterol, LDL cholesterol, triglycerides, diastolic blood pressure). The evidence was mixed for CV morbidity, with a significant association observed for total sedentary time but no evidence for the association with TV/video-viewing. The evidence was mixed for breast cancer with a dose-response association observed for self-reported TV viewing but no evidence for the association with self-reported sedentary time. The evidence was mixed for depression with a significant association observed for increased TV-viewing time but there was a lack of evidence for an association for total sedentary time. Mental health outcomes of sedentary behaviour could be bidirectional.

Breaking up bouts of sedentary behaviour reduced glucose, insulin, triglycerides, systolic and diastolic blood pressure. The duration of the sedentary bout did not have an effect on risk of developing CVD. Prolonged uninterrupted sitting did not have an effect of systolic or diastolic blood pressure.

For the critical outcomes looking at sedentary time, there was moderate certainty evidence for type 2 diabetes incidence, very low to moderate certainty evidence for all-cause and cause-specific (CVD, cancer) mortality, CVD incidence, and cardiometabolic health markers, low-certainty evidence for adiposity, and low- very low-certainty evidence for cancer incidence, and mental health outcomes. For the critical outcomes looking at patterns of sedentary behaviour, there was low-certainty evidence for cardiometabolic health markers and very low-certainty evidence for CVD incidence.

Additional considerations

Some studies show negative effects of sedentary behaviour when assessed as screen use. However, the previous review of evidence for the Canadian guidelines (22) identified mixed evidence for associations between screen use and health outcomes in adults. Specifically, associations differed by screen type (e.g., associations for TV viewing were detrimental but for computer and internet use were beneficial), particularly among older adults.

Providing a threshold limit of total sedentary screen time (which continues to evolve and includes many types of screen use) based on evidence which predominantly focused on TV viewing was not considered to be appropriate. Sedentary screen time/use can be detrimental to health, but for the purpose of this evidence update screen use was conceptualised as one of several types of sedentary behaviour and part of overall time spent sedentary.

Studies have typically measured sedentary behaviour using either i) self-report questionnaires which ask about “total time” spent in sedentary behaviours, or time spent in specific behaviours, such as television viewing, computer/screen use, and sitting; or ii) device-based assessments. There are no standardised measures or analytical protocols for sedentary behaviour and thus the reporting of results is heterogeneous. Recent methodological developments include the use of device-based assessment of time spent sedentary which can reduce measurement error and other biases inherent in self-reported recall.

The evidence is insufficient to recommend a threshold above which health risks increase, nor was it clear what duration of sitting could be considered ‘prolonged’, but this tends to be operationalised at greater than 30 or 60 minutes of uninterrupted sedentary time. Certain population groups, such as wheelchair users, unavoidably sit for extended periods of time. These groups should consider active breaks through wheeling or alternative chair-based activities in the same way that others might consider active breaks from sitting. Those living with disability are covered in separate recommendations.

Evidence summary tables are available in Evidence Annex 1.

Benefits vs Harms

Evidence that lower levels of sedentary behaviour was beneficial was observed for critical outcomes. There was no evidence for harms of decreasing sedentary behaviour. Therefore, benefits were determined to clearly outweigh harms.

Supporting conditions for implementation

The expert opinion of the Guideline Development Group, and a small body of evidence reporting on economic analyses of interventions and savings to the health care systems from decreasing levels of sedentary behaviour, informed discussion on the resource

implications of the recommendations in different settings. Results from the online public consultation showed that over 77% of respondents agreed or strongly agreed that the benefits of implementing the guidelines would outweigh the individual costs and 68% agreed or strongly agreed that the individual costs to use the guidelines were likely to be small or have little impact compared to not using the guidelines. Available evidence and expert opinion recognise that substantial health benefits can be achieved at low risk through activities that require no cost to the individual or specific equipment, such as breaking up sedentary time through standing and light ambulation. Overall, the Guideline Development Group assessed that while there are resource implications for implementation of actions to achieve these recommendations, it should be considered within current governance structures. Evidence supports that substantial health savings are possible for the health care system resulting from decreasing levels of sedentary behaviour.

Equity, ethics and human rights implications

79% of respondents to the online public consultation agreed or strongly agreed that implementing the guidelines can achieve a reduction in health inequity by increasing opportunities for all to be active and improve health outcomes. For reducing health inequity in implementing the recommendations for sedentary behaviour, the Guideline Development Group noted the importance of ensuring that there are safe environments and opportunities accessible for all, including people living with disability, socioeconomically and other disadvantaged people, to engage in reduced sedentary behaviour. The Guideline Development Group also noted the importance of addressing gender and other cultural biases that could restrict access and opportunity to participate in less sedentary options. A comprehensive approach to the design and implementation of policies across a number of sectors will be required to address barriers to less sedentary options for vulnerable groups, such as individuals experiencing socioeconomic disadvantage, women and girls, and people with disability. Recommendations for persons with disability and chronic conditions are addressed in separate recommendations.

Acceptability, values and preferences

There is little or no uncertainty about preferences regarding the critical outcomes. The estimated potential benefits of decreasing sedentary behaviour greatly outweighed any potential harms. Given the above, the Guideline Development Group did not consider the decision to be preference-sensitive.

Feasibility

Sedentary behaviour can be reduced at low cost.

Sleep recommendations

For health benefits, it is recommended that adults aged 18-64 years be physically active, limit sedentary behaviour, and obtain sufficient sleep each day. A healthy 24-hours includes:

Sleep

- Getting 7-9 hours of good quality sleep, with consistent bed and wake-up times. (Sleep duration: *Strong recommendation, low certainty evidence*) *(*Sleep timing*: Strong recommendation very low certainty evidence)*

Question

What is the association between sleep duration and health-related outcomes?

- Is there a dose-response association?
- Does the association vary by age (adults 18 to 64 years vs. older adults 65+ years)?

What is the association between sleep timing /consistency and health-related outcomes?

- Is there a dose-response association?
- Does the association vary by age (adults 18 to 64 years vs. older adults 65+ years)?

Methods

The methods and search strategies were prospectively registered in PROSPERO (CRD42024511101 & CRD42024542841).

Summary and quality of evidence

Sleep Duration

Sixteen systematic reviews of cohort studies published since 1st January 2019 to 29thFebruary 2024 that met inclusion criteria were included in the evidence-to-decision framework. Cohort studies with incident outcomes (i.e. new cases of disease) provides evidence of the causal role that sleep duration plays in health.

Evidence from cohort studies show a U-shaped relationship between sleep duration and outcomes such as the incidence of all-cause mortality, incident cardiovascular disease, incident stroke, incident obesity, and incident depression. The sleep durations predicting the lowest health risks were 7-8 hours.

There is suggestive evidence for a U-shaped relationship for outcomes such as incident atrial fibrillation, incident type 2 diabetes, and incident hypertension with lowest health risks corresponding to 7 hours, 7-8 hours, and 7-9 hours respectively.

Short sleep (≤ 7 hours) but not long sleep (≥8 hours) was prospectively associated with the development of anxiety. There was a lack of evidence for the association between sleep duration and the development of hyperlipidaemia.

Evidence for differences between younger and older adults were observed for all-cause mortality and incident obesity. For adults of all ages, elevated mortality was observed in sleep durations beyond 7-9 hours; for young adults, the association between short sleep and incident obesity was stronger than for older adults.

For the critical outcomes, there was moderate certainty evidence for the causal effect of sleep duration on incidence of stroke, low-certainty evidence for CVD and obesity incidence, and very low-certainty evidence for all-cause mortality, incidence of atrial fibrillation and type 2 diabetes, dyslipidaemia, hypertension, depression and anxiety.

Sleep timing /consistency

Ten primary studies published from 2019 to 2023 met the inclusion criteria and were included in the evidence-to-decision framework. Later and very early timed sleep and more variable sleep duration and timing was associated with an increased risk of all-cause mortality. Sleep consistency was associated with lower risk of incident CVD. There was a lack of evidence for the association between sleep consistency and adiposity and blood pressure, and a lack of evidence for the association between sleep timing and the development of obesity. There is suggestive evidence for a U-shaped relationship between sleep timing and all-cause mortality and incidence of CVD. However, the mechanisms by which this elevated mortality risk is caused is unclear, as there is limited evidence for the other critical outcomes.

For the critical outcomes, there was moderate certainty evidence for sleep consistency on mortality, low-certainty evidence for sleep timing on mortality and CVD incidence, and for sleep consistency on adiposity, and very low-certainty evidence for sleep consistency on CVD and blood pressure, and sleep timing on obesity incidence.

Additional considerations

There are no guidelines around sleep timing, consistency, or regularity, although it is widely recognised that sleeping during the day (not including siestas/naps) is associated with poorer sleep quality (e.g. as with jetlag) and poorer long-term health outcomes (e.g. as with night shift workers). Irregular sleep patterns (e.g. as with rotating shift workers) also cause poor sleep quality and result in circadian misalignment to the detriment of body systems. However, what is missing are quantitative cut-offs for what might be considered acceptable day-to-day variation that is associated with minimal health risks. Current sleep hygiene advice recommends bedtime and waketime should be within an hour day-to-day, based on the rule-of-thumb that the circadian system can shift approximately 1 hour per day.

Evidence summary tables are available in Evidence Annex 1.

Benefits vs Harms

Benefits were observed on a number of critical outcomes. Harms appear minimal or small. Therefore, benefits were determined to clearly outweigh harms.

Supporting conditions for implementation

The costs of inadequate sleep in Australia have been estimated in a number of economic reports (e.g. Hillman 2018 (23)). The impacts of inadequate sleep (as shown in experimental studies) include health, mood, wellbeing, productivity, and safety.

The economic costs that arise from these impacts include: 1) financial costs associated with health care, informal care provided outside the healthcare sector, productivity losses, non-medical work and vehicle accident costs, deadweight loss through inefficiencies relating to lost taxation revenue and welfare payments; and 2) the non-financial costs of loss of well-being. The estimated overall cost of inadequate sleep in Australia in 2016–2017 was $66.29 billion. The financial cost component was $26.22 billion, comprised of as follows:

direct health costs of $230 million for sleep disorders and $1.59 billion for associated conditions; productivity losses of $17.87 billion ($7.65 billion from reduced employment, $0.9 billion from premature death, $2.53 billion from absenteeism, and $6.79 billion from presenteeism); nonmedical accident costs of $3.64 billion; informal care costs of $0.61 billion; and deadweight loss of $2.28 billion. The non-financial cost of reduced well-being was $40.07 billion.

Available evidence and expert opinion recognise that health benefits can be achieved at low-risk and low individual cost through sleep extension for attaining sufficient sleep and through altering the timing and improving the regularity of sleep. While there are resource implications for implementation of actions to achieve these recommendations, it appears feasible and practicable to adopt the Canadian recommendations.

Equity, ethics and human rights implications

In total, 79% of respondents to the online public consultation agreed or strongly agreed that implementing the guidelines can achieve a reduction in health inequity by increasing opportunities for all to be active and improve health outcomes. For reducing health inequity in implementing the recommendations for sleep, the Guideline Development Group noted the importance of promoting interventions that address social and environmental determinants of sleep health. A comprehensive approach to the design and implementation of policies across a number of sectors will be required to reduce gender, sex, socioeconomic and cultural barriers to achieving sufficient sleep. Recommendations for persons with disability and chronic conditions are addressed in separate recommendations. While the literature review did not specifically address persons with disability and chronic conditions, the sleep timing/consistency/regularity recommendation is the same for all groups as the underlying circadian physiology remains unchanged. The only group where different or tailored sleep timing recommendations apply are shift workers. For shift workers, work schedules and associated work safety and fatigue management must be taken into account when providing sleep recommendations. The Australian Bureau of Statistics estimates that 16% of the working-aged population are shift workers.

Acceptability, Values and Preferences

Sleep duration guidelines already exist in English-speaking jurisdictions around the world (24, 25) and are widely accepted by researchers, clinicians, and the general population. The majority of Australian adults surveyed (94%) were aware of current sleep duration recommendations (26). There is little or no uncertainty about preferences regarding the critical outcomes. The estimated potential benefits of achieving sufficient sleep greatly outweighed any potential harms. Given the above, the Guideline Development Group did not consider the decision to be preference-sensitive.

Feasibility and considerations for implementation

Sleep duration, and sleep timing (and the associated consistency/regularity of that timing) can be varied at low cost. Policies to support recommended sleep duration are an important component of implementation.

Integrated recommendations

For health benefits, it is recommended that adults aged 18-64 years be physically active, limit sedentary behaviour, and obtain sufficient sleep each day. A healthy 24-hours includes:

Integrated

- Replacing sedentary behaviour with physical activity of any intensity, while obtaining sufficient sleep, can provide greater health benefits. Trading light-intensity physical activity for more moderate- to vigorous-intensity physical activity, while obtaining sufficient sleep, can also provide greater health benefits. (*Strong recommendation, very low certainty of evidence*)

Question

Is the composition of time spent in sleep, sedentary behaviour, and physical activity associated with health in adult populations?

Methods

The methods and search strategies were prospectively registered in PROSPERO (CRD42024512768).

Summary and quality of evidence

Nineteen studies in adults were published from August 2019 to December 2023 and met the inclusion criteria. Collectively, the findings indicated that the 24-hour movement behaviour composition was associated with health (specifically all-cause mortality, cardiometabolic health and adiposity). Favourable health associations were generally observed when the relative contribution of MVPA to the composition increased, and when time was reallocated into MVPA from any of the other behaviours. In adults, favourable health associations were generally observed when time was reallocated from sedentary behaviour into any of the other behaviours; and from sleep into LPA (all-cause mortality, adiposity and cardiometabolic health). Note that such associations are context-dependent and are inherently influenced by individuals' baseline movement behaviour compositions and health status.

The certainty of evidence was assessed as Very Low for all critical outcomes.

Additional considerations

The overall pattern of findings when considering all associations for all health outcomes suggested that health would improve if time was reallocated into MVPA and that health would worsen if time was taken out of MVPA, irrespective of what other movement behaviour MVPA was reallocated out of or into. Health would also improve if time were taken out of sedentary behaviour and reallocated into sleep or LPA.

Because the overall pattern of results did not present a picture of the 24-hour movement behaviour composition being a weaker or stronger predictor of health outcomes in adults younger than 65 years versus adults aged 65 or older, the integrated messages included in the guidelines are the same for both age groups.

Evidence summary tables are available in Evidence Annex 1.

Benefits vs Harms

In general, more MVPA and less sedentary behaviour (relative to other behaviours) are favourable for health. There is some indication that LPA may be important for better adiposity and cardiometabolic health outcomes, while sleep may be important for lowering incidence of CVD. The harms associated with each behaviour appear to be minimal or small. Therefore, the potential benefits of meeting the combined recommendation were determined to clearly outweigh the harms.

Supporting conditions for implementation

Results from the online public consultation showed that over 77% of respondents agreed or strongly agreed that the benefits of implementing the guidelines would outweigh the individual costs and 68% agreed or strongly agreed that the individual costs to use the guidelines are likely to be small or have little impact compared to not using the guidelines. Overall, the Guideline Development Group assessed that while there are resource implications for implementation of actions to achieve these recommendations, it should be considered within current governance structures and that the potential benefits of meeting all the recommendations outweigh the costs. Available evidence and expert opinion recognise that substantial health benefits can be achieved at low risk through activities that require no-to-low cost to the individual, such as walking.

Equity, ethics and human rights implications

In total, 79% of respondents to the online public consultation agreed or strongly agreed that implementing the guidelines can achieve a reduction in health inequity by increasing opportunities for all to be active and improve health outcomes. The Guideline Development Group judged that promoting the replacement of sedentary time with additional physical activity and trading light physical activity for more moderate- to vigorous-intensity physical activities, while preserving sufficient sleep, in the longer-term would probably increase health equity by improving health outcomes. Recommendations for persons with disability and chronic conditions are addressed in separate recommendations.

Acceptability, Values and Preferences

The Guideline Development Group concluded that there is little or no uncertainty about preferences regarding the critical outcomes. The estimated potential benefits greatly outweighed any potential harms. Given the above, the Guideline Development Group did not consider the decision to be preference-sensitive.

Feasibility and implementation considerations

The Guideline Development Group determined that the integration of the movement behaviours may enhance the feasibility of implementation of individual movement and sleep recommendations by individuals with opportunities to gradually replace undesirable behaviours with more desirable behaviours and recognising the importance of preserving sufficient sleep. Policies and facilities/infrastructure that support adults in engaging in physical activity, reducing sedentary behaviour, and achieving adequate sleep may play a valuable role in supporting implementation of the combined recommendations.

Older Adults (65+ years)

Physical activity recommendations

For health benefits, it is recommended that adults aged 65 years or older be physically active, limit sedentary behaviour and obtain sufficient sleep each day. A healthy 24-hours includes:

Physical activity

A variety of physical activities at different intensities, which can include:

- Moderate- to vigorous-intensity physical activities for 30-minutes or more on most days, such that there is an accumulation of 2.5 hours or more per week. (*Strong recommendation, moderate certainty evidence*)
- Muscle-strengthening activities at moderate or greater intensity that involve all main muscle groups on 2 or more days per week. (*Strong recommendation, low certainty evidence*)
- Functional activities that target mobility, balance, and coordination on 3 or more days per week. *(Strong recommendation, low certainty evidence)*
- Several hours of light-intensity physical activity per day. (*Strong recommendation, low certainty evidence)*

Question

What is the association between physical activity and health-related outcomes in adults aged 65 years and over?

- Is there a dose-response association (volume, duration, frequency, intensity)?
- Does the association vary by type or domain of physical activity?

Methods

The methods and search strategies were prospectively registered in PROSPERO (CRD42024526038).

Summary of evidence

While the majority of studies did not specify an upper limit of the age range, The primary evidence base used to inform recommendations in adults 18 to under 64 years of age was used for adults 65 years of age and older. The majority of studies in adults did not employ an upper age limit criterion and therefore included adults over 64 years of age. Therefore, the Guideline Development Group considered the evidence to be applicable to older adults. For older adults, evidence was reviewed for additional outcomes: falls and fall-related injuries, physical function, and cognition.

Overall physical activity

Four systematic reviews published from 2019 to 2023 on critical outcomes specifically evaluated for adults 65 years of age and older met the inclusion criteria. In older adults, physical activity was associated with reduced risk of falls and injury from falls, and improved physical and cognitive function.

For the critical outcomes, there was high certainty evidence for incidence of falls, moderate certainty evidence for cognitive and physical function, and low-certainty evidence for fall-related injury.

MVPA

Four systematic reviews published from 2019 to 2023 on critical outcomes specifically evaluated for adults 65 years of age and older met the inclusion criteria. In older adults, moderate- to vigorous-intensity physical activity is associated with improved cognition and physical function outcomes. There was a lack of evidence for the association between moderate- to vigorous-intensity physical activity and risk of falls or fall related injuries.

Functional/Mobility/Balance physical activity

Four systematic reviews published from 2019 to 2021 on critical outcomes specifically evaluated for adults 65 years of age and older met the inclusion criteria. Higher levels of Functional/Mobility/Balance physical activity lowered the risk of falls and fall-related injury and improved cognitive and physical function.

For the critical outcomes, there was high certainty evidence for incidence of falls, moderate certainty evidence for cognitive function and low-certainty evidence for falls related injury and physical function.

Muscle Strengthening Activity

Four systematic reviews published from 2019 to 2023 on critical outcomes specifically evaluated for adults 65 years of age and older met the inclusion criteria. In older adults, muscle strengthening exercise/resistance training is associated with improved cognitive and physical function. There was a lack of evidence for the association with falls or fall-related injury.

For the critical outcomes, there was low-certainty evidence for cognitive and physical function, and falls related injury and very low-certainty evidence for incidence of falls.

Evidence summary tables are available in Evidence Annex 1.

Benefits vs Harms

Benefits were observed on a number of critical outcomes. Harms appeared minimal or small. Therefore, benefits were determined to clearly outweigh harms.

Supporting conditions for implementation

The expert opinion of the Guideline Development Group, and a small body of evidence reporting on economic analyses of interventions and savings to the health care systems from increasing levels of physical activity, informed discussion on the resource implications of the recommendations in different settings. Results from the online public consultation showed that over 77% of respondents agreed or strongly agreed that the benefits of implementing the guidelines would outweigh the individual costs and 68% agreed or strongly agreed that the individual costs to use the guidelines are likely to be small or have little impact compared to not using the guidelines. Available evidence and expert opinion recognise that substantial health benefits can be achieved at low risk through activities that require no cost to the individual or specific equipment, such as walking. Evidence supports that substantial health savings are possible for the health care system resulting from increasing physical activity and limiting high levels of sedentary behaviour (17, 18, 19).

Overall, the Guideline Development Group assessed that while there are resource implications for implementation of actions to achieve these recommendations, it should be considered within current governance structures. Further, evidence supports that substantial health savings are possible for the health care system resulting from increasing levels of physical activity. In 2013 the global annual cost of physical inactivity was estimated at $78 billion due to direct health costs alone (20); and at a national level inactivity is estimated to cost between 1-3 % of health care budgets (21). Analysis of the cost and benefits of physical activity promotion indicate positive returns on investment over 15 years in terms of non-communicable disease prevention in many countries where the investment cases have been conducted.

Equity, ethics and human rights implications

In total, 79% of respondents to the online public consultation agreed or strongly agreed that implementing the guidelines can achieve a reduction in health inequity by increasing opportunities for all to be active and improve health outcomes. For reducing health inequality in implementing the recommendations, the Guideline Development Group noted the importance of ensuring that there are safe and supportive environments and opportunities for physical activity that are accessible for all, regardless of age, gender, sex, cultural background, socioeconomic status, health, disability, and other differences. The Guideline Development Group recommends different sectors, such as transportation, urban planning, community and sport, work together to improve equal access to physical activity opportunities and activity-friendly environments, and to reduce gender, sex, socioeconomic and cultural barriers to participating in physical activity. Compared with moderate-to-vigorous intensity physical activity, MSA may require certain levels of skills and physical literacy. This may lead to health inequality and should be considered in the implementation of the guidelines. Recommendations for persons with disability and chronic conditions are addressed in separate recommendations.

Acceptability, Values and Preferences

The Guideline Development Group concluded that there is little or no uncertainty about preferences regarding the critical outcomes. The estimated potential benefits of increasing physical activity greatly outweighed any potential harms. Given the above, the Guideline Development Group did not consider the decision to be preference-sensitive.

Feasibility and implementation considerations

Physical activity can be achieved at a low cost and does not require high-cost equipment. This may be particularly the case for LPA, as it can be accumulated through activities of daily living. Policies and infrastructure can facilitate the implementation of the physical activity guidelines. Older adults with disability or chronic conditions may need additional support to participate in physical activity.

Communication-related to the guidelines should highlight the importance of muscle strengthening activities. Examples should be provided in terms of what MSA entails, including examples of MSA without needing special equipment, such as push-ups, sit-ups and step ups. Activity-promoting environments and policies should be important components of implementation. Considering the ubiquity of step-counting trackers and that many individuals can easily comprehend and prefer step-based metrics, it is important to offer a step-based target as part of the good practice statement for those who are capable of stepping and prefer using step-based targets.

Sedentary behaviour recommendations

For health benefits, it is recommended that adults aged 65 years or older be physically active, limit sedentary behaviour and obtain sufficient sleep each day. A healthy 24-hours includes:

Sedentary Behaviour

- Limiting the amount of time spent being sedentary. (*Strong recommendation, moderate certainty evidence*)
- Breaking up prolonged periods of sedentary behaviour as often as possible. (*Strong recommendation, low certainty evidence*)

Question

What is the relationship between different types of sedentary behaviour and health outcomes in adults?

- Does physical activity modify the effect of sedentary behaviour on mortality?

What is the relationship between patterns of sedentary time (bouts, breaks etc) and health indicators in adults?

Methods

The methods and search strategies were prospectively registered in PROSPERO (CRD42024516832).

Summary and quality of evidence

The primary evidence base used to inform recommendations in adults 18 to under 64 years of age was used for adults 65 years of age and older. The majority of studies in adults did not employ an upper age limit criterion and therefore included adults over 64 years of age. Therefore, the Guideline Development Group considered the evidence to be applicable to older adults.

Additional considerations

Some studies show negative effects of sedentary behaviour when assessed as screen use. However, the previous review of evidence for the Canadian guidelines (22) identified mixed evidence for associations between screen use and health outcomes in adults. Specifically, associations differed by screen type (e.g., associations for TV viewing were detrimental but for computer and internet use were beneficial), particularly among older adults.

Evidence summary tables are available in Evidence Annex 1

Benefits vs Harms

Negative (desirable) effects of sedentary behaviour were observed on a number of critical outcomes. There was no evidence for harms of decreasing sedentary behaviour. Therefore, benefits were determined to clearly outweigh harms.

Supporting conditions for implementation

The expert opinion of the Guideline Development Group, and a small body of evidence reporting on economic analyses of interventions and savings to the health care systems

from decreasing levels of sedentary behaviour, informed discussion on the resource implications of the recommendations in different settings. Results from the online public consultation showed that over 77% of respondents agreed or strongly agreed that the benefits of implementing the guidelines would outweigh the individual costs and 68% agreed or strongly agreed that the individual costs to use the guidelines are likely to be small or have little impact compared to not using the guidelines. Available evidence and expert opinion recognise that substantial health benefits can be achieved at low risk through activities that require no cost to the individual or specific equipment, such as breaking up sedentary time through standing and light ambulation. Overall, the Guideline Development Group assessed that while there are resource implications for implementation of actions to achieve these recommendations, it should be considered within current governance structures. Evidence supports that substantial health savings are possible for the health care system resulting from decreasing levels of sedentary behaviour.

Equity, ethics and human rights implications

In total, 79% of respondents to the online public consultation agreed or strongly agreed that implementing the guidelines can achieve a reduction in health inequity by increasing opportunities for all to be active and improve health outcomes. For reducing health inequity in implementing the recommendations for sedentary behaviour, the Guideline Development Group noted the importance of ensuring that there are safe environments and opportunities accessible for all, including people living with disability, socioeconomically and other disadvantaged people, to engage in reduced sedentary behaviour. The Guideline Development Group also noted the importance of addressing gender and other cultural biases that could restrict access and opportunity to participate in less sedentary options. A comprehensive approach to the design and implementation of policies across a number of sectors will be required to address barriers to less sedentary options for vulnerable groups, such as socioeconomically disadvantaged, women and girls, and people with disability. Recommendations for persons with disability and chronic conditions are addressed in separate recommendations.

Acceptability, values and preferences

There is little or no uncertainty about preferences regarding the critical outcomes. The estimated potential benefits of decreasing sedentary behaviour greatly outweighed any potential harms. Given the above, the Guideline Development Group did not consider the decision to be preference-sensitive.

Feasibility

Sedentary behaviour can be reduced at low cost.

Sleep recommendations

For health benefits, it is recommended that adults aged 65 years or older be physically active, limit sedentary behaviour and obtain sufficient sleep each day. A healthy 24-hours includes:

Sleep

- Getting 7-8 hours of good quality sleep, with consistent bed and wake-up times. (Sleep Duration: *Strong recommendation, low certainty evidence*) *(*Sleep timing*: Strong recommendation, very low certainty evidence)*

Question

What is the association between sleep duration and health-related outcomes?

- Is there a dose-response association?
- Does the association vary by age (adults 18 to 64 years vs. older adults 65+ years)?

What is the association between sleep timing /consistency and health-related outcomes?

- Is there a dose-response association?
- Does the association vary by age (adults 18 to 64 years vs. older adults 65+ years)?

Methods

The methods and search strategies were prospectively registered in PROSPERO (CRD42024511101 & CRD42024542841).

Summary and quality of evidence

Sleep Duration

Sixteen systematic reviews of cohort studies published since 1st January 2019 to 29thFebruary 2024 that met inclusion criteria were included in the evidence-to-decision framework. Cohort studies with incident outcomes (i.e. new cases of disease) provides evidence of the causal role that sleep duration plays in health.

Evidence from cohort studies show a U-shaped relationship between sleep duration and outcomes such as the incidence of all-cause mortality, incident cardiovascular disease, incident stroke, incident obesity, and incident depression. The sleep durations predicting the lowest health risks were 7-8 hours.

There is suggestive evidence for a U-shaped relationship for outcomes such as incident atrial fibrillation, incident type 2 diabetes, and incident hypertension with lowest health risks corresponding to 7 hours, 7-8 hours, and 7-9 hours respectively.

Short sleep (≤ 7 hours) but not long sleep (≥8 hours) was prospectively associated with the development of anxiety. There was a lack of evidence for the association between sleep duration and the development of hyperlipidaemia.

Evidence for differences between younger and older adults were observed for all-cause mortality and incident obesity. For adults of all ages, elevated mortality was observed in sleep durations beyond 7-9 hours; for older adults, the U-shaped association was seen in sleep durations outside of 7-8 hours.

For the critical outcomes, there was moderate certainty evidence for incidence of stroke, low-certainty evidence for CVD and obesity incidence, and very low-certainty evidence for all-cause mortality, incidence of atrial fibrillation and type 2 diabetes, dyslipidaemia, hypertension, depression and anxiety.

Sleep timing /consistency

Primary studies published since 1st January 2019 to 29th February 2024 that met inclusion criteria were included in the evidence-to-decision framework. Later and very early timed sleep and more variable sleep duration and timing was associated with an increased risk of all-cause mortality. Sleep consistency was associated with lower risk of incident CVD. There was a lack of evidence for the association between sleep consistency and adiposity and blood pressure and a lack of evidence for the association between sleep timing and the development of adiposity. There is suggestive evidence for a U-shaped relationship between sleep timing and all-cause mortality and incidence of CVD. However, the mechanisms by which this elevated mortality risk is caused is unclear, as there is limited evidence for the other critical outcomes.

For the critical outcomes, there was moderate certainty evidence for the causal effect of sleep consistency on mortality, low-certainty evidence for sleep timing on mortality and CVD incidence, and for sleep consistency on adiposity, and very low-certainty evidence for sleep consistency on CVD and blood pressure, and sleep timing on obesity incidence.

Additional considerations

There are no guidelines around sleep timing, consistency, or regularity, although it is widely recognised that sleeping during the day is associated with poorer sleep quality (e.g. as with jetlag) and poorer long-term health outcomes (e.g. as with night shift workers). Irregular sleep patterns (e.g. as with rotating shift workers) also cause poor sleep quality and result in circadian misalignment to the detriment of body systems. However, what is missing are quantitative cut-offs for what might be considered acceptable day-to-day variation that is associated with minimal health risks. Current sleep hygiene advice recommends bedtime and waketime should be within an hour day-to-day, based on the rule-of-thumb that the circadian system can shift approximately 1 hour per day.

Evidence summary tables are available in Evidence Annex 1

Benefits vs Harms

Benefits were observed on a number of critical outcomes. Harms appear minimal or small. Therefore, benefits were determined to clearly outweigh harms.

Supporting conditions for implementation

The costs of inadequate sleep in Australia have been estimated in a number of economic reports (e.g. Hillman 2018 (23)). The impacts of inadequate sleep (as shown in experimental studies) include health, mood, wellbeing, productivity, and safety.

The economic costs that arise from these impacts include: 1) financial costs associated with health care, informal care provided outside healthcare sector, productivity losses, non-medical work and vehicle accident costs, deadweight loss through inefficiencies relating to lost taxation revenue and welfare payments; and 2) the non-financial costs of loss of well-being. The estimated overall cost of inadequate sleep in Australia in 2016–2017 was $66.29 billion. The financial cost component was $26.22 billion, comprised of as follows: direct

health costs of $230 million for sleep disorders and $1.59 billion for associated conditions; productivity losses of $17.87 billion ($7.65 billion from reduced employment, $0.9 billion from premature death, $2.53 billion from absenteeism, and $6.79 billion from presenteeism); nonmedical accident costs of $3.64 billion; informal care costs of $0.61 billion; and deadweight loss of $2.28 billion. The nonfinancial cost of reduced well-being was $40.07 billion.

Available evidence and expert opinion recognise that health benefits can be achieved at low-risk and low individual cost through sleep extension for attaining sufficient sleep and through altering the timing and improving the regularity of sleep. While there are resource implications for implementation of actions to achieve these recommendations, it appears feasible and practicable to adopt the Canadian recommendations.

Equity, ethics and human rights implications

In total, 79% of respondents to the online public consultation agreed or strongly agreed that implementing the guidelines can achieve a reduction in health inequity by increasing opportunities for all to be active and improve health outcomes. For reducing health inequity in implementing the recommendations for sleep, the Guideline Development Group noted the importance of promoting interventions that address social and environmental determinants of sleep health. A comprehensive approach to the design and implementation of policies across a number of sectors will be required to reduce gender, sex, socioeconomic and cultural barriers to achieving sufficient sleep. Recommendations for persons with disability and chronic conditions are addressed in separate recommendations. While the literature review did not specifically address persons with disability and chronic conditions, the sleep timing/consistency/regularity recommendation is the same for all groups as the underlying circadian physiology remains unchanged. The only group where different or tailored sleep timing recommendations apply are shift workers. For shift workers, work schedules and associated work safety and fatigue management must be taken into account when providing sleep recommendations. The Australian Bureau of Statistics estimates that 16% of the working-aged population are shift workers.

Acceptability, Values and Preferences

Sleep duration guidelines already exist in English-speaking jurisdictions around the world (24, 25) and are widely accepted by researchers, clinicians, and the general population. The majority of Australian adults surveyed (94%) were aware of current sleep duration recommendations (26). There is little or no uncertainty about preferences regarding the critical outcomes. The estimated potential benefits of achieving sufficient sleep greatly outweighed any potential harms. Given the above, the Guideline Development Group did not consider the decision to be preference-sensitive.

Feasibility and considerations for implementation

Sleep duration, and sleep timing (and the associated consistency/regularity of that timing) can be varied at low cost.

Integrated recommendations

For health benefits, it is recommended that adults aged 65 years or older be physically active, limit sedentary behaviour and obtain sufficient sleep each day. A healthy 24-hours includes:

Integrated

- Replacing sedentary behaviour with physical activity of any intensity, while obtaining sufficient sleep, can provide greater health benefits. Trading light-intensity physical activity for more moderate- to vigorous-intensity physical activity, while obtaining sufficient sleep, can also provide greater health benefits. (*Strong recommendation, very low certainty of evidence*)

Question

Is the composition of time spent in sleep, sedentary behaviour, and physical activity associated with health in adult populations?

Methods

The methods and search strategies were prospectively registered in PROSPERO (CRD42024512768).

Summary and quality of evidence

Twelve studies in older adults were published from August 2019 to December 2023 and met the inclusion criteria. Collectively, the findings indicated that the 24-hour movement behaviour composition was associated with health (specifically adiposity, brain health and cognition). Favourable health associations were generally observed when the relative contribution of MVPA to the composition increased, and when time was reallocated into MVPA from any of the other behaviours. In older adults, favourable health associations were observed when time was reallocated from sleep into LPA (cardiometabolic health and brain health and cognition); and from sedentary behaviour into sleep (incidence of CVD). Note that such associations are context-dependent and are inherently influenced by individuals' baseline movement behaviour compositions and health status.

The certainty of evidence was assessed as Very Low for all critical outcomes.

Evidence summary tables are available in Evidence Annex 1

Additional considerations

The overall pattern of findings when considering all associations for all health outcomes suggested that health would improve if time was reallocated into MVPA and that health would worsen if time was taken out of MVPA, irrespective of what other movement behaviour MVPA was reallocated out of or into. Health would also improve if time were taken out of sedentary behaviour and reallocated into sleep or LPA.

Because the overall pattern of results did not present a picture of the 24-hour movement behaviour composition being a weaker or stronger predictor of health outcomes in adults younger than 65 years versus adults aged 65 or older, the integrated messages included in the guidelines are the same for both age groups.

Benefits vs Harms

In general, more MVPA and less sedentary behaviour (relative to other behaviours) are favourable for health. There is some indication that LPA may be important for better adiposity and cardiometabolic health outcomes, while sleep may be important for lowering incidence of CVD. The harms associated with each behaviour appear to be minimal or small. Therefore, the potential benefits of meeting the combined recommendation were determined to clearly outweigh the harms.

Supporting conditions for implementation

Results from the online public consultation showed that over 77% of respondents agreed or strongly agreed that the benefits of implementing the guidelines would outweigh the costs and 68% agreed or strongly agreed that the costs to use the guidelines are likely to be small or have little impact compared to not using the guidelines. Overall, the Guideline Development Group assessed that while there are resource implications for implementation of actions to achieve these recommendations, that the potential benefits of meeting all the recommendations outweigh the costs. Available evidence and expert opinion recognise that substantial health benefits can be achieved at low risk through activities that require no-to-low cost to the individual, such as walking.

Equity, ethics and human rights implications

In total, 79% of respondents to the online public consultation agreed or strongly agreed that implementing the guidelines can achieve a reduction in health inequity by increasing opportunities for all to be active and improve health outcomes. The Guideline Development Group judged that promoting the replacement of sedentary time with additional physical activity and trading light physical activity for more moderate- to vigorous-intensity physical activities, while preserving sufficient sleep, in the longer-term would probably increase health equity by improving health outcomes. Recommendations for persons with disability and chronic conditions are addressed in separate recommendations.

Acceptability, Values and Preferences

The Guideline Development Group concluded that there is little or no uncertainty about preferences regarding the critical outcomes. The estimated potential benefits greatly outweighed any potential harms. The Guideline Development Group did not consider the decision to be preference-sensitive.

Feasibility and implementation considerations

The Guideline Development Group determined that the integration of the movement behaviours may enhance the feasibility of implementation of individual movement and sleep recommendations by individuals with opportunities to gradually replace undesirable behaviours with more desirable behaviours and recognising the importance of preserving sufficient sleep.

Adults and older adults with disability

Physical activity recommendations

For health benefits, it is recommended that adults and older adults with disability aged 18 years and older be physically active, limit sedentary behaviour, and obtain sufficient sleep each day. A healthy 24-hours includes:

Physical Activity

Doing different kinds of physical activities at various intensities regularly, including:

- Moderate-to vigorous-intensity physical activities for 30-minutes or more on most days, such that there is an accumulation of 2.5 hours or more per week. (*Strong recommendation, low certainty evidence*)
- Muscle-strengthening activities at moderate or greater intensity that involve all main muscle groups on 2 or more days per week. (*Strong recommendation, low certainty evidence*).
- Functional activities that target mobility, balance, and coordination on 3 or more days per week. *(Strong recommendation, low certainty evidence)*
- Several hours of light-intensity physical activity per day. (*Strong recommendation, very low certainty evidence)*

Question

What is the association between overall/combined physical activity and health-related outcomes?

- Is there a dose-response association (volume, duration, frequency, intensity)?

Does the association vary by type of physical activity?

Methods

Searches were conducted for studies in people living with any of the following health conditions; Spinal Cord Injury, Intellectual Disabilities, Multiple Sclerosis, Parkinson's Disease, Stroke, Frailty, Mixed disabling conditions, Moderate to severe Traumatic Brain Injury, Hip Fracture. Reviews published from 2017 (from 2014 for Parkinson's disease and hip fracture) to 2024 were eligible for inclusion. The methods and search strategies were prospectively registered in PROSPERO (CRD42024518503).

Summary and quality of evidence

Eleven systematic reviews were ultimately included and summarised across a range of outcomes (see Table S3; Evidence Annex 2): 1 for spinal cord injury, 3 for intellectual disability, 2 for multiple sclerosis, 1 for Parkinson's disease, 1 for stroke, 1 for mixed disabling conditions, 1 for moderate to severe traumatic brain injury, and 1 for hip fracture. No systematic reviews met the inclusion criteria for frailty for overall physical activity.

Spinal Cord Injury (SCI)

Significant improvements in cardiorespiratory fitness ($VO_{2peak,}$ absolute and relative values, and peak power output) were observed from hybrid/multimodal exercise interventions (*low*

certainty evidence). Adverse events were described in 18 interventions, comprising at least 49/1,331 (3.7%) participants. These events were related to: 1) bone, joint, or muscular pain (n=10 participants); 2) autonomic or cardiovascular function (n=8) 3) skin irritation or pressure sores (n=18); and 4) other events including anxiety, nausea, dizziness, and issues with testing equipment (n=3) (*very low certainty evidence*).

Intellectual Disability (ID)

Moderate benefits in upper and lower limb muscle strength were observed from progressive resistance strength training on its own or in addition to MVPA (*low certainty evidence*). Moderate benefits in cardiorespiratory fitness were observed from aerobic, combined aerobic and resistance training, resistance or plyometrics training (*very low certainty evidence*). There was uncertainty of the effect of unspecified physical activity on balance (*very low certainty evidence*). No adverse events were reported (*low certainty evidence*).

Multiple Sclerosis (MS)

Significant improvements in strength (*moderate certainty evidence*) and fatigue (*low certainty evidence*) were observed with combined MVPA and muscle strengthening activities. There was no evidence of any serious adverse events reported in the included studies.

Parkinson's Disease

Combined forms of physical activity improved mobility, quality of life (QoL) and disease progression. No adverse events were reported in 40 studies and no serious adverse events were reported in four studies. Adverse events were reported in 28 studies. The most frequently reported events were falls (18 studies) and pain (10 studies) (*very low certainty evidence*).

Stroke

Overall physical activity improved cardiorespiratory fitness (*low certainty evidence*), muscle strength, gait speed, walking endurance (*very low certainty evidence*), and balance outcomes (*moderate certainty evidence*). No significant differences were observed after mixed training (i.e., MVPA and resistance exercise) on mobility. There was no evidence of any serious adverse events.

Frailty

No evidence was found for frailty.

Mixed Disabling Conditions

Seventy-four trials including 2,954 participants were included in this review. Any type of physical activity (traditional Chinese exercise, yoga, dance, aquatic exercise, gym training, boxing, horse riding, Nordic walking, start to run) was found to improve mobility (combined mobility, walking endurance, balance) and physical fatigue (*low certainty evidence*).
The evidence of benefits for QoL is uncertain. Adverse events (reported in 35/74 trials) included injuries reported while participating in sport or physical recreation or during the intervention period. In total, 75 adverse events were reported in the experimental group, 21 of which were related and 54 which were not related to the intervention. In comparison, the control group reported 68 events, of which 9 were related to the intervention and 59 which were not.

Traumatic Brain Injury (TBI)

People with moderate to severe TBI demonstrated improved health-related quality of life following overall physical activity interventions (*low certainty evidence*).

Hip Fracture

Overall mobility strategies (i.e., including a range of exercise interventions) improve mobility outcomes, with benefits deemed clinically meaningful, in the hospital setting post hip fracture *(low to moderate certainty evidence)*. Overall mobility strategies improve mobility outcomes, with benefits deemed clinically meaningful, in the post-hospital setting post hip fracture (*high certainty evidence*). There is also evidence to suggest QoL and physical function are improved by overall mobility strategies in the post-hospital setting (*high certainty evidence*). There is little evidence to indicate mobility strategies improve short- or long-term mortality, hospital re-admission rates or return to pre-fracture residence. Interventions that contain multiple types of exercise probably lead to a moderate increase in mobility in the post-hospital setting following hip fracture *(low to moderate certainty evidence)*.

Overall

Although the strength of evidence varied for people with disability with different health conditions and for different outcomes, the overall strength of evidence was graded as low because of very low to moderate strength of evidence for a number of the critical outcomes. The Guideline Development Group determined that the evidence on the outcomes evaluated for adults and older adults without disabilities was applicable to adults with disabilities, albeit with some potential limitations in relation to indirectness of evidence (see also the evidence to decision tables for PA in adults and older adults).

Benefits vs Harms

Benefits were observed on several critical outcomes, including outcomes related to specific health conditions. When reported or addressed in the reviews, evidence of harms appeared minor (e.g., low-severity musculoskeletal symptoms) or low in prevalence overall, or were usually not related to the exercise intervention per se (i.e. related to other health condition treatments). However, evidence overall on potential harms and/or adverse events were generally limited, poorly reported, and/or were of very low to low quality and certainty, making the evaluation of potential harms data unsatisfactory. Overall, the benefits were determined to clearly outweigh harms.

Spinal Cord Injury (SCI)

The physical activity levels of people with SCI are less than 40% of the levels of their age-matched, able-bodied counterparts. This equates to an activity level of just 1 hour/day compared with more than 2.5 hours/day for able-bodied persons (27).

Intellectual Disability (ID)

Adults with intellectual and developmental disabilities often do not engage in recommended levels of physical fitness, and their levels of engagement are lower compared with adults without intellectual and developmental disabilities (28).

Multiple Sclerosis (MS)

There was consistent evidence that PA reduced, rather than increased, fatigue. This is an important finding for addressing misconceptions that PA may worsen fatigue (29).

Parkinson's Disease

People with Parkinson's disease demonstrate a lower level of physical activity than adults without Parkinson's disease, showing limited levels of sustained engagement in regular exercise and adopting a more sedentary lifestyle (30).

Traumatic Brain Injury (TBI)

A USA-based cohort study (n=472 participants) found that 55% of adults after moderate to severe TBI did not meet physical activity guidelines, and this was worse for adults aged 45+ years (68%) (31). In a cohort of 160 people with moderate to severe TBI, >80% of study participants had not returned to pre-injury leisure participation at 12-months post-injury, with pre-injury physical activity participation replaced by sedentary activity (i.e. watching television) (32). There is little evidence to guide a judgement on the harms of any physical activity in moderate to severe TBI. There is a risk of seizures if still recovering from acute illness, and/or anti-seizure medications not stable/routinely taken. The risk of musculoskeletal injuries because of participating in overall physical activity is likely no different to the risk posed to those without moderate to severe TBI.

Hip Fracture

Mobilisation is an important aspect of postoperative care and rehabilitation following hip fracture surgery. Low levels of physical activity are common following surgical repair of hip fractures (33). Post hip fracture surgery, people demonstrate reduced walking speed, report an increased fear of falling, and experience reduced levels of physical activity.
While physical activity increases in the six-months post-surgery, it remains below the levels of physical activity of non-hip fracture people of a similar age (34).

Supporting conditions for implementation

Spinal Cord Injury

Patients who commence routine physical activity in the first-year post SCI and experience typical motor function improvements would realise $420,000 to $630,000 in lifetime cost savings, primarily due to fewer hospitalisations and less reliance on assistive care (35).

Intellectual Disability

Supervision may be necessary, and can be delivered in community-based group sessions, particularly for exercises which are harder and in which individuals required more motivation (36).

Multiple Sclerosis

People with MS experience an increasing financial burden as their disease progresses, which is attributed to relapses and productivity losses (37). Currently, there is no evidence to inform whether physical activity interventions reduce disease progression in people with MS. Interventions that delay disease progression may reduce the financial burden of healthcare utilisation in people with MS. There is preliminary evidence to suggest that pragmatic physical activity interventions, combining supervised and home-based sessions over 12 weeks, are likely to be cost effective. The incremental cost per Quality-adjusted life years (QALY) of the physical activity intervention was $20,984 per QALY compared with usual care. The probability of the intervention being cost effective at a $41,400 per QALY threshold was 0.75, which increased to 0.78 at a $62,100 per QALY threshold (38).

Parkinson's Disease

People with Parkinson's Disease experience an increasing financial burden as their disease progresses. This is due to a greater annual use of healthcare resources and higher associated indirect costs (39). Participation in physical activity slows disease progression and therefore may reduce financial burden through decreased healthcare utilisation. People with Parkinson's Disease can participate in exercise programs from any setting (home, community, hospital etc.), however it is noted that the commitment to an exercise program is considered better if it is conducted at the hospital and under the supervision of a therapist (30).

Stroke

A mixed training intervention (MVPA and resistance training) was found to be cost-effective (incremental cost per QALY of $4,511 AUD) and deliver clinical benefits to people with stroke (40).

Frailty

There is no evidence to inform this judgement in Frailty.

Mixed Disabling Conditions

Examining physical activity levels and medical expenditure in adults with a disability, suggested that if adults with a disability move from an inactive status to physically active, the average yearly savings in medical expenditure would be $2564.33 (41).

Traumatic Brain Injury

Cost data is not available from any studies in TBI. Qualitative work from BRIDGES TBI guideline work exploring stakeholder perspectives (people with moderate to severe TBI, family members, support workers, community physical activity providers, funders, and health professionals) of the WHO physical activity guidelines for adults living with disability found that all stakeholder groups indicated costs of physical activity, transport, and equipment and, primarily, variability in insurance coverage, played a very significant role in enabling or obstructing access to physical activity.

Hip Fracture

There is no evidence to inform this judgement in Hip Fracture.

Focus Groups (people with disability and chronic conditions) - Australian 24-hour movement guidelines

Participants thought that people with disability and chronic conditions might need to access specialist support, modified physical activity programs and health professionals who could provide them with disability/chronic condition-informed guidance about safe, individualised and effective physical activity. People with disability and chronic conditions may have less 'earning power' than the general population because of limitations caused by physical impairments, pain, fatigue, etc. and this potentially lower socioeconomic status can limit access to physical activity guidance and opportunities.

Results from the online public consultation showed that over 77% of respondents agreed or strongly agreed that the benefits of implementing the guidelines would outweigh the costs and 68% agreed or strongly agreed that the costs to use the guidelines are likely to be small or have little impact compared to not using the guidelines.

Previous guidelines ADOLOPED

The expert opinion of the WHO Guideline Development Group, and a small body of evidence reporting on economic analyses of interventions and savings to the health care systems from increasing levels of physical activity, informed discussion on the resource implications of the recommendations in different settings. Available evidence and expert opinion recognise that substantial health benefits can be achieved at low risk through physical activity that require no cost to the individual or specific equipment, such as walking. Overall, the WHO Guideline Development Group assessed that while there are resource implications for implementation of actions to achieve these draft recommendations, it is possible within current governance structures. Further, evidence supports that substantial health savings are possible for the health care system resulting from increasing levels of physical activity. In 2013 the global annual cost of physical inactivity was estimated at $78 billion due to direct health costs alone (20); and at a national level inactivity is estimated to cost between 1-3 % of health care budgets (21). Analysis of the cost and benefits of physical activity promotion indicate positive returns on investment over 15 years in terms of non-communicable disease prevention in many countries where the investment cases have been conducted (42).

Equity, ethics and human rights implications

Australian considerations (from TBI clinical practice guideline work Hassett, Johnson 2024) (43)

General population studies have shown lower physical activity levels in lower socioeconomic areas. Providing an intervention to increase physical activity will likely benefit those in more disadvantaged groups. There is access to the National Disability Insurance Scheme (NDIS) for many adults (<65 years) living with disability to support engagement in formal physical activities. However, completion of forms, follow-up with the funders etc. for access to these funding schemes may be more challenging for those from lower socioeconomic backgrounds, or those with English as a second language. National guidelines may support providers to deliver and funders to fund the overall promotion of physical activity for those living in more regional, rural and remote areas that aren't as linked in with specialist rehabilitation or disability services.

Focus Groups (people with disability and chronic conditions) - Australian 24-hour movement guidelines

Participants noted that people with disability and chronic conditions face greater challenges in being physically active than the general population. While health professionals were recognised as the best source of tailored guidance for safe and effective physical activity, some participants noted that not everyone has easy or equitable access to health professionals and even for those that do, consultations tend to prioritise other health topics and may not include consideration of physical activity. Young people can find it hard to transition from children’s services to adult services, and physical activity can get lost in this transition.

In addition to the focus groups, 79% of respondents to the online public consultation agreed or strongly agreed that implementing the guidelines can achieve a reduction in health inequity by increasing opportunities for all to be active and improve health outcomes.

Previous guidelines ADOLOPED

For reducing health inequity in implementing the recommendations, the WHO Guideline Development Group noted the importance of ensuring that there are safe facilities and opportunities accessible for all, including people living with disability, socioeconomically and other disadvantaged people, to engage in physical activity. The WHO Guideline Development Group also noted the importance of addressing gender and other cultural biases that could restrict access and opportunity to participate in physical activity.
A comprehensive approach to the design and implementation of policies across a number of sectors will be required to address barriers to physical activity for vulnerable groups, such as socioeconomically disadvantaged, women and girls and people with disability.

Acceptability, Values and Preferences

Spinal Cord Injury

Qualitative research into the lived experience of exercise for people with SCI found participants described multiple benefits of exercise, including increased independence, improved mental health, and increased engagement in social activity (44).

Intellectual Disability

In qualitative research with 11 adults with Intellectual Disability participating in fitness classes, all participants stated that they were aware of how important exercise was as part of being healthy and that the social aspect was very important. When asked about preferences of 12 activities (6 sedentary and 6 active), 82% favoured active activities over sedentary activities for their top 6 activities (5/6 of active activities were classified as MVPA) (36). A survey of 140 caregivers of adults with Down syndrome identified dancing as most preferred physical activity, followed by walking and active video gaming. Rowing, using an elliptical machine, and jogging were reported to be the least favourite (45).

Multiple Sclerosis

A qualitative synthesis of 19 studies in people with MS found that participants perceived increased social participation, better self-management and control, and maintenance of physical function as beneficial consequences engaging in physical activity and exercise (29). There were preferences for choice in the type of physical activity modality and for peer support. Qualitative research into the experiences of physical activity for people with MS found that the decision to engage in physical activity is complex and fluid due to the unpredictable nature of MS, with concerns around increased fatigue (46). An individualised approach to physical activity prescription should be taken that accounts for personal beliefs and barriers to physical activity engagement.

Parkinson’s Disease

Qualitative research into the experiences of physical activity for people with Parkinson’s Disease found participants preferred activities that were tailored and personally relevant to their needs - linking to the unique progression of disease experienced by individuals. There was a preference for activities that were fun and enjoyable (30).

Stroke

There is no evidence to inform this judgement in Stroke.

Frailty

There is no evidence to inform this judgement in Frailty.

Mixed Disabling Conditions

Data from the Australian national survey of sport, exercise and active recreation (AusPLAY) analysis of adults with and without disability discovered adults with a disability reported physical health or fitness (55%) as the main motivator to participation in physical activity with fun/enjoyment reported as second highest (34%). This is the same top two motivators for adults without disability (47).

Traumatic Brain Injury

An 8-week, remotely delivered (via email) self-management program ('myMoves') was acceptable to community-based people with an acquired brain injury (including 4 with TBI), with >95% (22/23) of participants being either very satisfied or satisfied with the program and stating that it was worth their time (48). No specific research has been conducted in moderate to severe TBI to inform the value people living with moderate to severe TBI place on the main outcomes.

Hip Fracture

There is no evidence to inform this judgement in hip fracture.

Focus Groups (people with disability and chronic conditions) - Australian 24-hour movement guidelines

Participants highlighted the importance of tailoring physical activity and guideline recommendations to accommodate those with disabilities and chronic health conditions. This should include flexible physical activity programs that can be adjusted in response to different physical capacities and needs, and to variable symptoms such as pain and fatigue. They stressed repeatedly that incremental progression in physical activity is especially important for people with disability and chronic conditions who may have significant physical limitations, and that they may feel overwhelmed and not know where/how to start. The need to recognise and respect the diversity of people with disability and chronic conditions was emphasised. They wanted accessible guidance about physical activity that recognised their specific needs and was delivered using encouraging, motivating messaging.
Being inspired by role models with disability and chronic conditions, and connections with family, friends and community supports were considered to be important.

Previous guidelines ADOLOPED

The WHO Guideline Development Group concluded that there is little or no uncertainty about preferences regarding the main outcomes, including cardiometabolic outcomes. The estimated potential benefits greatly outweighed any potential harms. Given the above, the Guideline Development Group did not consider the decision to be preference-sensitive.

Feasibility and implementation considerations

Spinal Cord Injury

There are likely various intrapersonal, interpersonal, community, institutional and policy-level barriers and some facilitators to application and uptake of physical activity guidelines. For example, lack of accessible exercise equipment and venues, costs of memberships and equipment, lack of transportation (49).

Intellectual Disability

Barriers to physical activity participation include intellectual impairment (reduced ability to learn and problem-solve), physical limitations and access to accessible environments, a lack of social support, a lack of knowledge at both an individual level (e.g., not knowing where to go or how to exercise) and at the professional level (e.g., limited understanding of how to make adaptations and fitness professionals' lack of preparation to work with individuals with disabilities), and challenges with transportation (36). Most interventions described were supervised (health professional or exercise trainer) and delivered in groups (50), highlighting the importance of instructor and care-giver support and feedback (36).

Multiple Sclerosis

Perceived barriers to participating in physical activity included minimal or no disabled facilities, minimal or conflicting advice from healthcare professionals, fatigue, and fear and apprehension (29).

Parkinson's Disease

Perceived barriers to participating in physical activity were seen as lack of time, low outcome expectations and cultural challenges (30). Participants also reported difficulty obtaining a diagnosis and a lack of information about the benefits of physical activity as barriers to participating in physical activity.

Stroke

In a qualitative exploration of Australian physiotherapy practices when prescribing strength training with stroke survivors undergoing gait rehabilitation, it was found that physiotherapists displayed wide variation in their knowledge, interpretation and implementation of strength training principles, and strength training exercise prescription was seldom evidence or guideline based (51). While clinical preference of colleagues, and the need to modify practice to align with workforce resources were workplace factors that affected the prescription of strength training to people with stroke. It has previously been reported that people with stroke declined participation in a cardiac rehabilitation-based program, which includes aerobic and resistance training, because of a lack of interest in the program and transportation difficulties (52). Women and people without diabetes were also less likely to participate, while for people who have severe ambulatory or cognitive deficits, and no home exercise support, alternative models that that typically offered are needed.

Frailty

There is no evidence to inform this judgement in Frailty.

Mixed Disabling Conditions

Injury or poor health is the most reported barrier to participating in physical activity for adults with a disability (62%) (47).

Traumatic Brain Injury

Qualitative work from BRIDGES TBI guideline work exploring stakeholder perspectives (people with moderate to severe TBI, family members, support workers, community physical activity providers, funders, and health professionals) of the WHO physical activity guidelines for adults living with disability found that all stakeholder groups were overall accepting of the recommendations but identified that some with more severe injuries (cognitive, behavioural

and/or physical impairments) may not be able to meet the recommended intensity and/or duration or may need additional support/equipment to achieve this. It was suggested resources that provide examples of how a range of different people with TBI meet these levels (and how to define moderate intensity activity) would be useful. It was also noted that the good practice points of the WHO guideline were very important. Qualitative work also identified issues of navigating NDIS system, need for specific resources (e.g., equipment, staff) and appropriate opportunities (e.g., inclusive or disability specific facilities and programs). Issues of community facility instructors not having knowledge or experience working with people with disability were raised.

Hip Fracture

Older adults post-hip fracture have indicated that there are few barriers to exercise, though health-related concerns, such as pain, fatigue, illness, or injury have been reported. Enablers to exercise participation include intrinsic factors, such as determination, observing improvements, and including exercise as a part of a daily routine. Functional recovery to improve mobility and complete activities of daily living was a commonly reported motivation to participate in exercise (53).

Focus Groups (people with disability and chronic conditions) - Australian 24-hour movement guidelines

People with disability and chronic conditions may be more susceptible to anxiety about how to access physical activity guidance and options, what physical activity is appropriate for them and how to overcome motivational barriers. They may feel more overwhelmed by recommended physical activity goals than the general population and lack belief that they can achieve them. People with disability and chronic conditions may not access information about physical activity optimally, for example using unreliable sources of information, such as social media, and may find it hard to identify information that takes account of their needs.

Previous guidelines ADOLOPED

The WHO Guideline Development Group determined that physical activity can be achieved at low cost and in most cases does not require high-cost equipment. Policies and infrastructure can facilitate implementation of the physical activity guidelines.

It is important that the guidelines are contextualised with the additionally recommended companion statements. Adults with more severe disability may need additional support and/or funding to participate in physical activity. This may include transport to get to and from the activity, supervision of the activity, and adaptive equipment to participate in the activity. Funding may be required for these supports (e.g., through NDIS if <65 years). Policies and facilities/infrastructure to support physical activity are an important component of implementation, particularly consideration for accessible and inclusive settings, trained staff to work with people with disability and opportunities across the inclusion spectrum (54). Physical activity programs for people with disabilities should include both aerobic and resistance-based components, ensuring that intensity is progressed in a measurable way. Physical activity programs delivered in the form of supervised progressive exercise training are recommended in people with intellectual disability and may also be required for people with more severe disability.

Sedentary behaviour recommendations

For health benefits, it is recommended that adults and older adults with disability aged 18 years and older be physically active, limit sedentary behaviour, and obtain sufficient sleep each day. A healthy 24-hours includes:

Sedentary behaviour

- Limiting the amount of time spent being sedentary. (*Strong recommendation, very low certainty evidence).*
- Breaking up prolonged periods of sedentary behaviour as often as possible. (Conditional *recommendation, very low certainty evidence*)

Question

What is the association between Sedentary behaviour (total volume or pattern) and health-related outcomes?

- What is the association between patterns of sedentary time (bouts, breaks, frequency, duration, timing) and health outcomes?

What is the association between Light-Intensity Physical Activity and health-related outcomes?

- Is there a dose-response association (volume, duration, frequency, intensity)?
- Does the association vary by type of physical activity?

Methods

Searches were conducted for studies in people living with any of the following health conditions; spinal cord injury, intellectual disabilities, multiple sclerosis, Parkinson's disease, stroke, frailty, mixed disabling conditions, moderate to severe traumatic brain injury, hip fracture. The methods and search strategies were prospectively registered in PROSPERO (CRD42024518503).

Summary and quality of evidence

No systematic reviews met the inclusion criteria for Sedentary behaviour (total volume or pattern) and Light-Intensity Physical Activity. The Guideline Development Group determined that the evidence on the outcomes evaluated for adults and older adults without disabilities was applicable to adults with disabilities, albeit with some potential limitations in relation to indirectness of evidence (see also the evidence to decision tables for physical activity in adults and older adults).

Benefits vs Harms

There is no direct evidence to inform this judgement in people with disability. Given benefits outweigh the harms for overall physical activity in people with disability, it is likely that this will be the same for Light-Intensity Physical Activity, although the size of the desirable effects is unknown. There is no direct evidence on harms of limiting sedentary behaviour in people with disability, but this was judged to be minimal, particularly if the inverse of sedentary behaviour was to replace sedentary behaviour with more physical activity of any intensity; for which there is moderate certainty evidence from WHO (8).

Supporting conditions for implementation

Results from the online public consultation showed that over 77% of respondents agreed or strongly agreed that the benefits of implementing the guidelines would outweigh the costs and 68% agreed or strongly agreed that the costs to use the guidelines are likely to be small or have little impact compared to not using the guidelines.

Previous guidelines ADOLOPED

The expert opinion of the WHO Guideline Development Group, and a small body of evidence reporting on economic analyses of interventions and savings to the health care systems from increasing levels of physical activity, informed discussion on the resource implications of the recommendations in different settings. Available evidence and expert opinion recognise that substantial health benefits can be achieved at low risk through physical activity that requires no cost to the individual or specific equipment, such as walking (even at light intensities). While sedentary behaviour can be limited and replaced with more active alternatives at low cost. Overall, the WHO Guideline Development Group assessed that while there are resource implications for implementation of actions to achieve these draft recommendations, it is possible within current governance structures. Further, evidence supports that substantial health savings are possible for the health care system resulting from increasing levels of physical activity. In 2013 the global annual cost of physical inactivity was estimated at $78 billion due to direct health costs alone (20); and at a national level inactivity is estimated to cost between 1-3 % of health care budgets (21). Analysis of the cost and benefits of physical activity promotion indicate positive returns on investment over 15 years in terms of non-communicable disease prevention in many countries where the investment cases have been conducted (42).

Equity, ethics and human rights implications

In total, 79% of respondents to the online public consultation agreed or strongly agreed that implementing the guidelines can achieve a reduction in health inequity by increasing opportunities for all to be active and improve health outcomes.

Previous guidelines ADOLOPED

For reducing health inequity in implementing the recommendations, the WHO Guideline Development Group noted the importance of ensuring that there are safe facilities and opportunities accessible for all, including people living with disability, socioeconomically and other disadvantaged people, to engage in physical activity. The WHO Guideline Development Group also noted the importance of addressing gender and other cultural biases that could restrict access and opportunity to participate in physical activity.
A comprehensive approach to the design and implementation of policies across a number of sectors will be required to address barriers to physical activity for vulnerable groups, such as socioeconomically disadvantaged, women and girls and people with disability.

Acceptability, Values and Preferences

Previous guidelines ADOLOPED

The WHO Guideline Development Group concluded that there is little or no uncertainty about preferences regarding the main outcomes, including cardiometabolic outcomes.
The estimated potential benefits greatly outweighed any potential harms. Given the above, the Guideline Development Group did not consider the decision to be preference-sensitive.

Feasibility and implementation considerations

Previous guidelines ADOLOPED

Sedentary behaviour can be limited and replaced with more active alternatives at low cost. Physical activity can be achieved at low cost and does not require high-cost equipment. Policies and infrastructure can facilitate implementation of the sedentary behaviour and Light-Intensity Physical Activity guideline recommendations.

Little work has been done in people with movement difficulties from included health conditions to determine what activities constitute Light-Intensity Physical Activity (as higher oxygen requirements are likely for people with movement difficulties compared to what is reported in the Compendium of physical activity (55). It is important that the guidelines are contextualised with the additionally recommended companion statements. Adults with more severe disability may need additional support and/or funding to participate in physical activity. Policies and facilities/infrastructure to support physical activity and limit sedentary behaviour are an important component of implementation, particularly consideration for accessible and inclusive settings, trained staff, and local/community opportunities. Certain population groups, such as wheelchair users, unavoidably sit for extended periods of time. For these groups, sedentary behaviour should be defined as time spent with low energy expenditure. Alternatively, these groups could consider active breaks through wheeling or alternative chair-based activities in the same way that others might consider active breaks from sitting. When considering sensible implementation of guidelines in healthcare settings with constrained resources, clinician time (i.e., time needed to treat/implement a guideline) and the potential burden and opportunity costs (or referral options) should also be factored in (56, 57).

Sleep recommendations

Specific numbers of hours of sleep per day has not been recommended for adults and older adults with disability given the heterogeneity of the groups involved. Recommendations for sleep may be different than for the general population and there is insufficient evidence to suggest specific amounts of sleep are preferred. Adults and older adults with disability are advised to use the sleep duration guidelines for adults or older adults as a starting point if necessary.

Adults and older adults with chronic conditions

Physical activity recommendations

For health benefits, it is recommended that adults and older adults with chronic conditions aged 18 years and older be physically active, limit sedentary behaviour, and obtain sufficient sleep each day. A healthy 24-hours includes:

Physical activity

Doing different kinds of physical activities at various intensities regularly, including:

- Moderate- to vigorous-intensity physical activities for 30-minutes or more on most days, such that there is an accumulation of 2.5 hours or more per week. (*Strong recommendation, moderate certainty evidence*)
- Muscle-strengthening activities at moderate or greater intensity that involve all main muscle groups on 2 or more days per week. (*Strong recommendation, moderate certainty evidence*).
- Functional activities that target mobility, balance, and coordination on 3 or more days per week. *(Strong recommendation, low certainty evidence)*
- Several hours of light-intensity physical activity per day. (*Strong recommendation, very low certainty evidence)*

Question

What is the association between Overall PA: Overall/combined activity and health-related outcomes?

- Is there a dose-response association (volume, duration, frequency, intensity)?
- Does the association vary by type of physical activity?

Methods

Searches were conducted for studies in people living with any of the following chronic conditions; type 2 diabetes, cardiovascular disease (excluding stroke), hypertension, chronic lung conditions, osteoarthritis (knee or hip), osteoporosis, cancer/cancer survivors, major depression disorder, anxiety and stress-related disorders, and dementia. Obesity was not included as a chronic condition due to this being included in the scope of concurrently developed Clinical Practice Guidelines for the management of overweight and obesity in adults, adolescents and children in Australia. Reviews published from 2014 (from 2017 for major depression disorder and anxiety and stress disorders; from 2018 for osteoarthritis and hypertension; and from 2019 for diabetes) to 2024 were eligible for inclusion. The methods and search strategies were prospectively registered in PROSPERO (CRD42024518503).

Summary and quality of evidence

A total of 76 systematic reviews were ultimately included and summarised across a range of outcomes (see Table S3; Evidence Annex 3): 7 for type 2 diabetes, 11 for cancer, 4 for hypertension, 5 for osteoarthritis, 12 for cardiovascular disease, 14 for chronic lung conditions, 6 for major depression disorder and 4 for anxiety and stress disorders, 8 for osteoporosis, and 10 for dementia.

Type 2 Diabetes:

For comorbidities, there was new evidence on complications and depressive symptoms (low certainty). For disease progression (HbA1c), a new review provides guidelines for specific types of activities, with multicomponent, strength, and walking ranked as being the most effective interventions for HbA1c reductions. This also suggests an optimal dose at around 36 min/day brisk walking with stronger effects in those with higher HbA1c.

Hypertension:

No new/relevant CVD mortality evidence was found, so recommendations were based on reviewed evidence from the WHO and US PAGAC (review-level observational evidence upgraded due to dose-response) which shows a 16–67% reduced risk of CVD mortality. For quality of life (QoL) this was based on evidence from WHO of aerobic exercise and WHOQoL-BREF. Evidence was downgraded from moderate to low certainty due to risk of bias.

Osteoarthritis:

For all outcomes, there was evidence of a gradually decreasing effect over time to no better than usual care at around 9 months. For disease progression previous US PAGAC evidence suggested that up to 10,000 steps/day of physical activity does not increase the risk of progression on magnetic resonance imaging in people with knee osteoarthritis. There were no adverse effects or increased risk of developing osteoarthritis (WHO, low certainty). Collectively, the current evidence (low certainty) does not show that exercise increases the risk of structural progression in people without or with established knee osteoarthritis.

CVD:

There was evidence for small/weak reductions in mortality risk depending on the CVD type and type of evidence (trial short-term follow-up or prospective cohort studies); larger effects were shown for hospitalisations and fatal and/or non-fatal heart attacks.

Cancer survivors:

Previous WHO reviews found high certainty evidence on mortality and cancer mortality outcomes. Updated all-cause mortality evidence from randomised controlled trials (RCT) in patients with haematological malignancies suggests small/minimal effect (moderate certainty). Minimal data was found on adverse events, but what is reported suggests minor effects mostly related to chemotherapy impacts.

Chronic lung conditions:

The benefits of overall physical activity have primarily been demonstrated in outpatient settings. There is preliminary evidence to support the non-inferiority of alternative modes of delivery of combined progressive resistance strength training in addition to moderate- to vigorous-intensity physical activities (MVPA), including home-based programs and telerehabilitation.

Overall:

Although the strength of evidence varied for persons with different chronic conditions and different outcomes, the overall strength of evidence was graded as moderate because of moderate or high strength of evidence for a number of the critical outcomes.

The Guideline Development Group determined that the evidence on the outcomes evaluated for adults and older adults without chronic conditions was applicable to adults with chronic conditions, albeit with some potential limitations in relation to indirectness of evidence (see also the evidence to decision tables for physical activity in adults and older adults).

Benefits vs Harms

Benefits were observed on several critical outcomes, including outcomes related to specific chronic conditions. When reported or addressed in the reviews, evidence of harms appeared minor (e.g., low-severity musculoskeletal symptoms) or low in prevalence overall, or were usually not related to the exercise intervention per se (i.e. related to other chronic condition treatments). However, evidence overall on potential harms and/or adverse events were generally poorly reported, limited, and/or is of very low to low quality and certainty, making its evaluation challenging (58-61).

Chronic Lung Conditions:

Benefits:
Low and moderate certainty evidence from Cochrane meta-analyses indicates that overall physical activity in the form of pulmonary rehabilitation can provide clinically significant improvements in functional exercise capacity, health-related QoL, and dyspnoea in people with chronic obstructive pulmonary disease (COPD), bronchiectasis, Interstitial lung disease (ILD), asthma, and pulmonary hypertension. There is very low certainty evidence from observational studies that higher levels of overall physical activity may reduce mortality risk in people with COPD (62).

Harms:
No intervention-related adverse events were reported for stable COPD, post hospital discharge for exacerbation of COPD, or for ILD. In adults with pulmonary hypertension, exercise training is probably not associated with an increased risk of a serious adverse event (one death in the usual care group in one study). Very low certainty evidence indicates that people with COPD who engage in at least 100 min/week of walking may have a reduced risk of mortality (HR 0.55, 95% CI 0.32 to 0.92) compared with people who engage in levels of walking below this threshold (63).

Overall, the benefits were determined to clearly outweigh harms.

Supporting conditions for implementation

Chronic lung conditions:

In Australia and New Zealand, exacerbations resulting in hospitalisation account for 50-75% of the direct COPD-associated healthcare costs. Pulmonary rehabilitation commenced within 3 weeks of hospital discharge approximately halves the odds of hospital readmission (64). An economic evaluation conducted in the US reported that pulmonary rehabilitation following hospitalisation would save approximately $171 per session and had an incremental cost-effectiveness ratio of $884 per session for $50,000/ quality-adjusted life years (QALY) and $1,597 per session for $100,000/QALY (65). Compared with conventional centre-based pulmonary rehabilitation, home-based pulmonary rehabilitation may be more cost effective (-$4,497, 95% CI -$12,250 to $3,257) and have higher cost utility (0.025 QALY, 95% CI -0.038 to 0.086) (66) in Australia.

Focus Groups (people with disability and chronic conditions) - Australian 24-hour movement guidelines

Participants thought that people with disability and chronic conditions might need to access specialist support, modified physical activity programs and health professionals who could provide them with disability/chronic condition-informed guidance about safe, individualised, and effective physical activity. People with disability and chronic conditions may have less 'earning power' than the general population because of limitations caused by physical impairments, pain, fatigue, etc. and this lower socioeconomic status can limit access to physical activity guidance and opportunities.

Previous guidelines ADOLOPED

The expert opinion of the WHO committee, and a small body of evidence reporting on economic analyses of interventions and savings to the health care systems from increasing levels of physical activity, informed discussion on the resource implications of the recommendations in different settings. Physical activity can be achieved at low cost and does not require high-cost equipment. Available evidence and expert opinion recognise that substantial health benefits can be achieved at low risk through activities that require no cost to the individual or specific equipment, such as walking (even at light-intensities). Evidence supports that substantial health savings are possible for the health care system resulting from increasing physical activity and limiting high levels of sedentary behaviour (67, 68). Overall, the WHO committee assessed that while there are resource implications for implementation of actions to achieve these draft recommendations, it is possible within current governance structures.

Equity, ethics and human rights implications

Major depressive disorder/ anxiety and stress-related disorders

Mental illness is associated with a higher risk of preventable physical health conditions and a significant gap in life expectancy (69, 70). Addressing this disparity is a critical public health priority, and improving access to supervised exercise interventions could play a valuable role in supporting better health outcomes. There is evidence recommending early intervention with physical activity may change the trajectory of physical health and mental health symptoms i.e. disease progression (70).

Chronic lung conditions

Availability of pulmonary rehabilitation in Australia is driven by appropriate funding; at present, pulmonary rehabilitation is funded through the Independent Health and Aged Care Pricing Authority, Tier 2 Non-Admitted Services classifications and related pricing (71). This funding enables some rehabilitation programs to be provided via the public hospital system. To enable the wider provision of exercise training programs for people living with chronic lung conditions, particularly in primary care settings, major changes to funding models are needed.

Focus Groups (people with disability and chronic conditions) - Australian 24-hour movement guidelines

Participants noted that people with disability and chronic conditions face greater challenges in being physically active than the general population. While health professionals were recognised as the best source of tailored guidance for safe and effective physical activity, some participants noted that not everyone has easy or equitable access to health

professionals and even for those that do, consultations tend to prioritise other health topics and may not include consideration of physical activity. Young people can find it hard to transition from children's services to adult services, and physical activity can get lost in this transition.

Previous guidelines ADOLOPED

To reduce health inequities, the WHO committee emphasised the need for safe and accessible facilities and opportunities for all individuals, regardless of chronic condition, disability, or socioeconomic status, to support participation in physical activity and reduce sedentary behaviour. The WHO committee also highlighted the importance of creating inclusive environments that accommodate diverse gender identities and cultural backgrounds. This includes ensuring access to spaces that are physically, culturally, and psychologically safe, enabling individuals to engage in physical activity in ways that align with their needs, preferences, and values. A comprehensive, multi-sector approach to policy design and implementation is essential to address barriers to physical activity for populations at high risk of inactivity, including socioeconomically disadvantaged populations, women and girls, and people with chronic conditions and/or disabilities. These policies should prioritise equity, accessibility, and inclusivity.

Acceptability, Values and Preferences

Major Depressive Disorder (MDD)

Structured, supervised and/or group exercise can be more effective than exercise counselling, emphasising the importance of referral to exercise professionals for MDD (72, 73). Interventions may benefit from utilising one or a combination of factors including activity enjoyment, social interaction, mindfulness and immersion in green spaces (72, 74). Effectiveness increases with MVPA intensity, however lower intensities might be helpful in initially engaging people, then later progressing physical activity intensity (72). Yoga and strength training appeared to be the most acceptable modalities (72).

Anxiety and stress-related disorders

Physical activity is well tolerated by people with anxiety and stress related disorders (75). Physical activity supervised by an exercise professional, results in lower drop out (75). Physical activity which is enjoyable or personally important and chosen (autonomously motivated) is likely to have greater benefits on mental health symptoms (disease progression). It is recommended that some physical activity should be taken during leisure-time or in active travel, and where possible prioritising enjoyment or personally important and chosen activities to have the greatest benefits on mental health symptoms (74).

Chronic Lung Conditions:

People with COPD report a need for ongoing, structured and supervised exercise opportunities. There is a desire to exercise within a peer group combined with an opportunity for social interaction. Exercise facilities such as community gyms can provoke feelings of embarrassment or intimidation and may be possible barrier to ongoing participation in exercise (76). Alternative modes of delivery of rehabilitation, including home-based pulmonary rehabilitation, telerehabilitation, and mobile app based pulmonary rehabilitation, are acceptable to people with COPD (77, 78).

Focus Groups (people with disability and chronic conditions) - Australian 24-hour movement guidelines

Participants highlighted the importance of tailoring physical activity and guideline recommendations to accommodate those with disabilities and chronic health conditions. This should include flexible physical activity programs that can be adjusted in response to different physical capacities and needs, and to variable symptoms such as pain and fatigue. They stressed repeatedly that incremental progression in physical activity is especially important for people with disability and chronic conditions who may have significant physical limitations. They may feel overwhelmed and not know where/how to start. The need to recognise and respect the diversity of people with disability and chronic conditions was emphasised. They wanted accessible guidance about physical activity that recognised their specific needs and was delivered using encouraging, motivating messaging. Being inspired by role models with disability and chronic conditions, and connections with family, friends and community supports were considered to be important.

Previous guidelines ADOLOPED

The WHO Guideline Development Group concluded that there is little or no uncertainty about preferences regarding the main outcomes. Quality of life and physical function outcomes are often highlighted as high value outcomes to middle-aged and older adults those managing chronic conditions. Disease progression outcomes are important as part of actively managing the chronic conditions and reducing the risk of detrimental health outcomes (e.g. mortality, disease incidence, etc).

The estimated potential benefits greatly outweighed any potential harms. Given the above, the Guideline Development Group did not consider the decision to be preference sensitive.

Feasibility and implementation considerations

Cardiovascular disease

Trial-based economic evaluations showed that cardiac rehabilitation is a cost-effective use of healthcare resources compared with usual care (79). Evidence suggests that cardiac rehabilitation is cost-effective, especially with exercise as a component; however, there is large heterogeneity and research is needed to determine the most cost-effective design within particular healthcare or home-based contexts (80, 81).

Dementia

Carers' willingness to engage, their circumstances, perspectives and previous experiences of exercise seem to play a key role in facilitating adherence (82). The design, location and organisation of activity/walking groups facilitate adherence. This reflects the need for such activities to be part of a wider 'program of care', tailored to the needs of the individual, flexible and convenient. Knowledgeable and well-trained instructors or healthcare professionals have also been recommended as group exercise leaders (82).

Chronic lung conditions

Most evidence for aerobic training comes from hospital-based pulmonary rehabilitation programs. Difficulty with transport to the hospital facility is commonly reported by patients as a barrier to accessing pulmonary rehabilitation (83). Availability of pulmonary rehabilitation programs in a variety of settings, particularly primary care, may improve program access and adherence (84).

Focus Groups (people with disability and chronic conditions) - Australian 24-hour movement guidelines

People with disability and chronic conditions may be more susceptible to anxiety about how to access physical activity guidance and options, what physical activity is appropriate for them and how to overcome motivational barriers. They may feel more overwhelmed by recommended physical activity goals than the general population and lack belief that they can achieve them. People with disability and chronic conditions may not access information about physical activity optimally, for example using unreliable sources of information such as social media, and may find it hard to identify information that takes account of their needs.

Previous guideline ADOLOPED

Physical activity can be achieved at low cost and in most cases does not require high-cost equipment. Policies and infrastructure can facilitate implementation of the physical activity guidelines.

It is important that the guidelines are contextualised with the additionally recommended companion statements. Adults with more severe conditions or disability may need additional support and/or funding to participate in physical activity. This may include transport to get to and from the activity, supervision of the activity, and adaptive equipment to participate in the activity. Funding may be required for these supports (e.g., through NDIS if <65 years). Policies and facilities/infrastructure to support physical activity and limit sedentary behaviour are an important component of implementation, particularly consideration for accessible and inclusive settings, trained staff, and local/community opportunities. Physical activity programs for people with chronic conditions should include both aerobic and resistance-based components, ensuring that intensity is progressed in a measurable way. Physical activity programs delivered in the form of supervised progressive exercise training (both aerobic and resistance-based components) are recommended in people with chronic conditions, particularly type 2 diabetes, CVD, Cancer, mental health disorders, and chronic lung conditions. When considering sensible implementation of guidelines in healthcare settings with constrained resources, clinician time (i.e., time needed to treat/implement a guideline) and the potential burden and opportunity costs (or referral options) should also be factored in (56, 57).

Sedentary behaviour recommendations

For health benefits, it is recommended that adults and older adults with chronic conditions aged 18 years and older be physically active, limit sedentary behaviour, and obtain sufficient sleep each day. A healthy 24-hours includes:

Sedentary Behaviour

- Limiting the amount of time spent being sedentary. (*Strong recommendation, very low certainty evidence*)
- Breaking up prolonged periods of sedentary behaviour as often as possible. (*Conditional recommendation, very low certainty evidence*)

Question

What is the association between Sedentary behaviour (total volume or pattern) and health-related outcomes?

- What is the association between patterns of sedentary time (bouts, breaks, frequency, duration, timing) and health outcomes?

What is the association between Light-Intensity Physical Activity and health-related outcomes?

- Is there a dose-response association (volume, duration, frequency, intensity)?
- Does the association vary by type of physical activity?

Methods

Searches were conducted for studies in people living with any of the following chronic conditions; type 2 diabetes, cardiovascular disease (excluding stroke), hypertension, chronic lung conditions, osteoarthritis (knee or hip), osteoporosis, cancer/cancer survivors, major depression disorder, anxiety and stress-related disorders, and dementia. The methods and search strategies were prospectively registered in PROSPERO (CRD42024518503).

Summary and quality of evidence

Five systematic reviews were ultimately included and summarised across a range of outcomes (see Table S4; Evidence Annex 3): 1 for type 2 diabetes, 2 for cancer, 1 for cardiovascular disease, and 1 for chronic lung conditions.

Observational evidence indicated that higher levels of sedentary time were associated with increased all-cause mortality risk in cancer survivors and cancer-specific mortality risk in colorectal cancer survivors (low certainty evidence). Light-Intensity Physical Activity increased quality of life for cancer patients undergoing, and who completed, cancer treatment (very low certainty evidence). Decreasing sedentary behaviour while increasing light-intensity activity reduced HbA1c and waist circumference in people with type 2 diabetes (very low certainty evidence). There was indirect evidence for an effect of Light-Intensity Physical Activity to improve physical function in people with cardiovascular disease (very low certainty evidence). Higher levels of Light-Intensity Physical Activity lowered the risk of mortality in people with ILD (very low certainty evidence).

Overall

Although the strength of evidence varied for persons with different chronic conditions and different outcomes, the overall strength of evidence was graded as very low because of very low to low strength of evidence for some of the critical outcomes.

The Guideline Development Group determined that the evidence on the outcomes evaluated for adults and older adults without chronic conditions was applicable to adults with chronic conditions, albeit with some potential limitations in relation to indirectness of evidence (See also the evidence to decision tables for physical activity in adults and older adults).

Benefits vs Harms

There is some very low certainty evidence, but mostly limited direct evidence, to inform this judgement in people with chronic conditions. Given benefits outweigh the harms for overall physical activity in people with disability, it is likely that this will be the same for light-intensity physical activity, although the size of the desirable effects is unknown. There is no direct evidence on the harms of limiting sedentary behaviour in people with chronic conditions, but this was judged to be minimal, particularly if the inverse of sedentary behaviour was to replace sedentary behaviour with more physical activity (of any intensity; for which there is moderate certainty evidence from WHO 2020).

From the general population:

Although there was limited direct evidence on sedentary behaviour or light-intensity physical activity for the chronic conditions examined, both the previous WHO Guideline Development Group (85, 86) and the Australian Guideline Development Group considered and concluded that the evidence from general populations was applicable. Therefore, the adult recommendations were extrapolated to adults with chronic conditions, but the certainty of the evidence was downgraded for indirectness. The extrapolation of evidence, alongside a small amount of direct evidence (i.e., type 2 diabetes and cancer) is supported largely by the assessment that most studies imposed no upper age limit criterion, included adults over the age of 65 years, and may have included adults with chronic conditions. Additionally, no reasons were identified as to why the evidence on the health impacts of sedentary behaviour or light-intensity physical activity would not also apply to adults with chronic conditions.

Overall, the potential benefits were determined to outweigh harms.

Supporting conditions for implementation

The expert opinion of the Guideline Development group, and a small body of evidence reporting on economic analyses of interventions and savings to the health care systems from increasing levels of physical activity, informed discussion on the resource implications of the recommendations in different settings. Results from an online public consultation showed that over 77% of respondents agreed or strongly agreed that the benefits of implementing the guidelines would outweigh the individual costs and 68% agreed or strongly agreed that the individual costs to use the guidelines are likely to be small or have little impact compared to not using the guidelines

Physical activity can be achieved at low cost and does not require high-cost equipment. Available evidence and expert opinion recognise that substantial health benefits can be achieved at low risk through activities that require no cost to the individual or specific equipment, such as walking (even at light-intensities). Evidence supports that substantial

health savings are possible for the health care system resulting from increasing physical activity and limiting high levels of sedentary behaviour (67, 68).

Overall, the committee assessed that while there are resource implications for implementation of actions to achieve these recommendations, it is possible within current governance structures. Further, evidence supports that substantial health savings are possible for the health care system resulting from increasing levels of physical activity. In 2013 the global annual cost of physical inactivity was estimated at $78 billion due to direct health costs alone (87); and at a national level inactivity is estimated to cost between 1-3 % of health care budgets (21). Analysis of the cost and benefits of physical activity promotion indicate positive returns on investment over 15 years in terms of non-communicable disease prevention in many countries where the investment cases have been conducted.

Chronic lung conditions

In Australia and New Zealand, exacerbations resulting in hospitalisation account for 50-75% of the direct COPD-associated healthcare costs. Pulmonary rehabilitation commenced within 3 weeks of hospital discharge approximately halves the odds of hospital readmission (64). An economic evaluation conducted in the US reported that pulmonary rehabilitation following hospitalisation would save approximately $171 per session and had an incremental cost-effectiveness ratio of $884 per session for $50,000/ quality-adjusted life years (QALY) and $1,597 per session for $100,000/QALY (65). Compared with conventional centre-based pulmonary rehabilitation, home-based pulmonary rehabilitation may be more cost effective (-$4,497, 95% CI -$12 250 to $3257) and have higher cost utility (0.025 QALY, 95% CI -0.038 to 0.086) (66) in Australia.

Equity, ethics and human rights implications

In total, 79% of respondents to the online public consultation agreed or strongly agreed that implementing the guidelines can achieve a reduction in health inequity by increasing opportunities for all to be active and improve health outcomes. For reducing health inequity in implementing the recommendations, the committee noted the importance of ensuring that there are safe facilities and opportunities accessible for all, including people living with chronic conditions and/or disability, socioeconomically and other disadvantaged people, to limit high levels of sedentary behaviour and engage in physical activity. The Guideline Development Group also noted the importance of addressing gender and other cultural biases that could restrict access and opportunity to participate in physical activity.

A comprehensive approach to the design and implementation of policies across several sectors will be required to address barriers to physical activity for vulnerable groups, such as socioeconomically disadvantaged, women and girls and people with disability.

Chronic lung conditions

Availability of pulmonary rehabilitation in Australia is driven by appropriate funding; at present, pulmonary rehabilitation is funded through the *Independent Health and Aged Care Pricing Authority, Tier 2 Non-Admitted Services* classifications and related pricing (IHACPA, 2023) (71). This funding enables some rehabilitation programs to be provided via the public hospital system. To enable the wider provision of exercise training programs for people living with chronic lung conditions, particularly in primary care settings, major changes to funding models are needed.

Acceptability, Values and Preferences

The Guideline Development Group concluded that there is little or no uncertainty about preferences regarding the main outcomes. Quality of life and physical function outcomes are often highlighted as high value outcomes to middle-aged and older adults those managing chronic conditions. Disease progression outcomes are important as part of actively managing the chronic conditions and reducing the risk of detrimental health outcomes (e.g. mortality, disease incidence, etc.). The estimated potential benefits greatly outweighed any potential harms. Given the above, the committee did not consider the decision to be preference-sensitive.

Feasibility and implementation considerations

Chronic lung conditions

Disease symptoms, including breathlessness, fatigue, and mobility problems, are consistently identified by people with COPD in qualitative studies as a barrier to physical activity participation (88, 89). Psychological barriers to physical activity such as fear of breathlessness, embarrassment, and not feeling in control of their condition, have also been reported (90, 91). Increasing participation in light intensity physical activity may be a more realistic goal in people living with chronic lung conditions and may offer a gateway to higher intensity physical activity (92).

Overall

Sedentary behaviour can be limited and replaced with more active alternatives at low cost. Physical activity can be achieved at low cost and in most cases does not require high-cost equipment. Policies and infrastructure can facilitate implementation of the sedentary behaviour guidelines.

Little work has been done in people with movement difficulties from included health conditions to determine what activities constitute light physical activity, as higher oxygen requirements are likely for people with movement difficulties compared to what is reported in the Compendium of Physical Activity (55).

It is important that the guidelines are contextualised with the additionally recommended companion statements. Adults with more severe conditions or disability may need additional support and/or funding to participate in physical activity. This may include transport to get to and from the activity, supervision of the activity, and adaptive equipment to participate in the activity. Funding may be required for these supports (e.g., through NDIS if <65 years).

Policies and facilities/infrastructure to support physical activity and limit sedentary behaviour are an important component of implementation, particularly consideration for accessible and inclusive settings, trained staff, and local/community opportunities. Certain population groups, such as wheelchair users, unavoidably sit for extended periods of time. For these groups, sedentary behaviour should be defined as time spent with low energy expenditure. Alternatively, these groups could consider active breaks through wheeling or alternative chair-based activities in the same way that others might consider active breaks from sitting.

When considering sensible implementation of guidelines in healthcare settings with constrained resources, clinician time (i.e., time needed to treat/implement a guideline) and the potential burden and opportunity costs (or referral options) should also be factored in (56, 57).

Sleep recommendations

Specific numbers of hours of sleep per day has not been recommended for adults and older adults with chronic conditions given the heterogeneity of the groups involved. Recommendations for sleep may be different than for the general population and there is insufficient evidence to suggest specific amounts of sleep are preferred. Adults and older adults with chronic conditions are advised to use the sleep duration guidelines for adults or older adults as a starting point if necessary.

Aboriginal and Torres Strait Islander adults and older adults

Question

What is the association between physical activity and health-related outcomes in Aboriginal and Torres Strait Islander adults 18 – 64 years and over 65 years of age?

Summary and quality of evidence

Four systematic reviews, 12 intervention studies (7 of which were included in the systematic reviews) and no cohort studies were published from 2013 to 2024 and met the inclusion criteria. Higher levels of physical activity increased strength and functional ability, lowered weight, BMI and waist circumference, and increased health related quality of life. Mixed effects were show for falls prevention, hypertension and cardiometabolic health markers.

For the critical outcomes, there was moderate certainty evidence for adiposity, and low-certainty evidence for physical function, hypertension, health-related quality of life and cardiometabolic health markers.

While there is less evidence of the association between physical activity and health outcomes in Aboriginal and Torres Strait Islander adults or older adults, existing physical activity evidence is consistent with non-Indigenous evidence where there are comparable study designs, acknowledging the lack of specific Aboriginal and Torres Strait Islander physical activity cohort studies and of any sedentary behaviours, sleep and 24-h movement studies beyond that of a cross-sectional design. The Guideline Development Group therefore suggests that Aboriginal and Torres Strait Islander people can use the guidelines that are applicable to them.

Benefits vs Harms

Benefits were observed on a number of critical outcomes. No harms were reported. Therefore, benefits were determined to clearly outweigh harms.

Supporting conditions for implementation

Available evidence and expert opinion recognise that substantial health benefits can be achieved at low risk through activities that require no cost to the individual or specific equipment, such as walking and body weight exercise. Overall, the Guideline Development Group assessed that while there are resource implications for implementation of actions to achieve these recommendations, it should be considered within current governance structures.

Equity, ethics and human rights implications

For reducing health inequity in implementing the recommendations, ensuring that there are safe facilities and opportunities accessible for all Aboriginal and Torres Strait Islander adults is important, including people living with disability or chronic conditions, socioeconomically and other disadvantaged people, to engage in physical activity. The importance of addressing gender and other cultural biases that could restrict access and opportunity to participate in physical activity was also noted. A comprehensive approach to the design and implementation of policies across a number of sectors will be required to address barriers to

physical activity for Aboriginal and Torres Strait Islander adults. Recommendations for persons with disability and chronic conditions are addressed in separate recommendations.

Acceptability, Values and Preferences

The Guideline Development Group concluded that there is little or no uncertainty about preferences regarding the main outcomes, including cardiometabolic outcomes.
The estimated potential benefits greatly outweighed any potential harms. Given the above, the Guideline Development Group did not consider the decision to be preference-sensitive.

Feasibility and implementation considerations

Physical activity can be achieved at low cost and does not require high-cost equipment. Personal attitudes and life circumstances of Aboriginal and Torres Strait Islander people should be considered in promoting the holistic health and personal benefits of physical activity whilst also addressing the challenges, recognising the importance of family and cultural connections and providing opportunities for positive connections for Aboriginal and Torres Strait Islander people with family, peers and broader networks. Policies and facilities/infrastructure to support physical activity are an important component of implementation. Physical activity and sport programs should be sustainably resourced and receptive to participants' needs and expectations, respecting connections to culture and supporting communities to be supportive, safe, and well-resourced.

Research gaps

The Guideline Development Group has identified several critical research gaps that need to be addressed to enhance the development of 24-hour movement behaviour guidelines. One of the primary gaps is the need for more high-quality studies and systematic reviews, particularly those that utilise device-measured physical activity, sedentary behaviour and sleep. Current evidence is predominantly based on observational studies, which limits the strength and applicability of the recommendations. Additionally, there is a significant heterogeneity in the effect sizes for some outcomes which further complicates the formulation of precise guidelines. This is the case for cancer outcomes, which is likely due to heterogeneity in the condition as well as small sample sizes and rare events. The group also noted that surrogates of disease progression or remission, such as insulin resistance and type 2 diabetes mellitus, are not adequately captured in existing studies.

Another major area of concern is the lack of evidence for priority populations, such as Aboriginal and Torres Strait Islander people, adults with chronic conditions or disabilities, and Culturally and Linguistically Diverse populations, particularly around sedentary behaviour and sleep. The current guidelines primarily focus on moderate- to vigorous-intensity physical activities measured in minutes per week, but there is a growing need to develop 24-hour guidelines that consider daily activity patterns. Furthermore, there is limited research on muscle strengthening activity and its benefits, which is crucial for developing comprehensive physical activity guidelines. The inclusion of steps per day and the intensity or cadence of these steps also requires more robust evidence to inform recommendations.

In the area of sedentary behaviour and screen time, future research should aim to improve the quality of evidence. Most reviews on sedentary behaviour have low AMSTAR ratings, with a low certainty of evidence for most outcomes. There is also a lack of research on the impact of breaks in sedentary time or patterns of sedentary behaviour and insufficient evidence to set quantified recommendations. Similarly, the evidence on screen time is limited, particularly regarding the dose and threshold of screen use, the type and timing of screen activities, and the context in which screen time occurs. This gap is especially pertinent for different population groups, including individuals with disabilities, who may use screens differently. The existing evidence for the health effects of standing is unclear and nuance exists with the distinction between active vs. passive standing, making it difficult to provide evidence-based guidance on the recommended amount of time spent standing and whether this is incorporated into sedentary behaviour or light intensity activity recommendations.

Future research on sleep should address the significant gaps in current evidence, which has low certainty due to deficiencies in primary studies. More high-quality, device-based studies are needed to provide reliable data on long-term outcomes associated with the different facets of sleep, in particular around quality of life, and accident prevention. There is also a need for evidence synthesis around waking behaviours that promote sleep quality. Additionally, research should focus on underrepresented populations, such as Aboriginal and Torres Strait Islander people and adults with chronic conditions or disabilities, to ensure guidelines are inclusive. By addressing these gaps, future studies can help develop comprehensive sleep guidelines that promote overall health and well-being.

Lastly, research on integrated behaviours, which considers the combined effects of physical activity, sedentary behaviour, and sleep, is relatively sparse. The existing studies often have low certainty of evidence because they are predominantly cross-sectional in design and do not adequately represent underrepresented populations such as those from culturally and linguistically diverse backgrounds. There is a need for more intervention studies to understand the optimal balance of these behaviours and their trade-offs, investigating a “goldilocks day” (the right balance of physical activity, sedentary behaviour, and sleep) for health. Future research should focus on high-quality randomised controlled trials where appropriate, and device-based measures and strategies to achieve a healthy balance.

Communication, Dissemination, Implementation and Integration Planning

This section details outcomes from a communications workshop conducted as part of the consensus panel meeting, a broader full-day consultation workshop with key stakeholders. The workshop included consideration of methods for dissemination, key messages, communication platforms, and methods for mass media and social media programs to assist stakeholder communication and public education.

The results are presented here and include recommended strategies for dissemination (e.g., purposive distribution of guideline to specific audiences), stakeholder engagement (communication to professionals who would act as key intermediaries in reaching patients and communities), and public education and implementation (actions to support the public in meeting guideline recommendations/behavioural benchmarks).

Background

Evidence suggests that public knowledge and awareness of guidelines may lead to greater adherence. Further, evidence indicates well supported and targeted public education contributes to changes is awareness and knowledge, and with sufficient dose it can impact behavioural intention and behavior. (93-95)

A consensus panel meeting was held in person at the Wollongong University Innovation Campus on 7-10 April 2024 with the Guideline Leadership Group and key stakeholder organisations to develop the draft guidelines. An important element of this consultation process was the World Café workshop, gathering stakeholder inputs on potential dissemination, implementation and communication activities to support the guidelines.

World Café Workshop participants

The Guideline Development Group invited 25 key stakeholder organisations to join the consensus panel, after review and approval by the Department. Stakeholder organisations were representative of priority consumer groups, professionals who would be end users of the guidelines, state and federal government representatives, and representatives from the health, transport and sports sectors. The majority of workshop participants were engaged face-to-face, with an additional 4 stakeholder representatives participating online and providing inputs live to the other workshop participants.

In total, 40 consensus panel attendees (24 stakeholder representatives and 16 leadership group members) participated in the workshop to generate outputs focused on strategies around engaging the general population as well as priority populations. A participant list is attached in Annex 6.

Communications, knowledge translation, dissemination and implementation activities at the Wollongong Workshop; World Café

The World Café method is a progressive group exercise to address a range of questions and/or brainstorm ideas or inputs to elements of a strategy, in this case a communication,

dissemination and implementation strategy for the Australian 24-hour Movement Guidelines for Adults and Older Adults. Participants were divided into 4 groups to address 4 different elements of Advocacy, Communications, Stakeholder Engagement and Implementation. These themes were:

- Media and complementary communication strategies
- Kits/Guides and related training
- Activities targeting high risk groups.
- Activities targeting seniors / older adults.

Participants were allocated to four groups, and rotated through each discussion theme, spending time brainstorming inputs and ideas with a facilitator. For each subsequent rotation the other groups 'added value' expanding on points raised in the first group, asking questions, and adding new ideas (snowballing). This is a time-efficient way of solving several aspects of complex questions by progressive building of ideas and consensus.
The findings from each group were displayed on posters around the walls of the venue for participants to peruse during the consensus meeting. Participants were asked to vote on the activities they believed would most effectively enhance the dissemination, communication, and implementation of the guidelines, in order to identify the highest-priority areas for further focus.

Considerations for implementation

Based on the workshop findings it is suggested that the Australian 24-Hour Movement Guidelines for Adults and Older Adults be complemented by dissemination, communication, and stakeholder engagement strategies with priority afforded to:

1. Communications, dissemination and implementation activities directed to the general population, with a focus on simple messaging in media, and infographics in online media.
2. Nuanced communications, dissemination and implementation activities directed to adults, older adults, people with disabilities and those with chronic conditions, and in the context of the cultural and linguistic diversity of Australia
3. Nuanced communications, dissemination and implementation activities directed in conjunction with Aboriginal and Torres Strait Islander people and stakeholders.
4. Professional stakeholder engagement and mobilisation in dissemination and education strategies, and engagement in co-design of communications and activities.
5. Collaborative partnerships, working within current systems – e.g. Local government councils, health NGO's, professional associations, Aboriginal and Torres Strait Islander groups.
6. Engagement with and support for dissemination through complementary programs, noting that evidence-informed strategies are the key, building on what is already there. For example, Heart Foundation Walking.
7. Engagement of sectors outside health, such as transport agencies, education and local governments, assisting their role in Guideline implementation and awareness raising.

Stakeholder Consultation

Stakeholder consultation activities with members of the public and other key stakeholders were undertaken during the planning and development of the Australian 24-Hour Movement Guidelines for Adults (18-64 years) and Older Adults (65 years and over):

1. An online survey was distributed at the beginning of the project to solicit feedback from consumers and stakeholders on the preferred guidelines from the GRADE-ADOLOPMENT process (Canadian 24-hour Movement Guidelines for Adults and Older Adults) to guide the development of draft recommendations.
2. a) A public consultation was hosted by the Department on the draft recommendations and companion statements developed at the consensus panel meeting.
2. 2. b) Stakeholder organisation members of the consensus panel provided written feedback on the draft recommendations and companion statements developed.
3. a) An online survey was distributed to the general public and stakeholders to provide feedback on the final draft of the guidelines and to explore stakeholders' perceptions of acceptability, and considerations for implementation and dissemination.
3. b) Concurrent focus groups were held with priority populations (Aboriginal and Torres Strait Islander people, people living with disability or chronic health conditions, and people from a Culturally and Linguistically Diverse (CALD) background) to gain a deeper insight into the acceptability and usability of the draft guidelines and any specific considerations for the messaging of the guidelines to their communities.

1. Summary of the results of the pre-development online survey

The survey was conducted on the secure web-based database-management application, REDCap, and was open to the Australian public for feedback from 22nd March 2024 to 5thApril 2024. The anonymous survey link employed the snowballing method for distribution through key stakeholders and their communication channels. The survey presented an example of 24-hour guidelines (the current Canadian 24-Hour Movement Guidelines) and asked questions on the clarity and acceptability of integrated movement behaviour guidelines (i.e. those including physical activity, sedentary behaviour and sleep across a 24-hour day). Results were presented to the consensus panel members at the consensus panel meeting, and informed the development of the draft recommendations. This research was reviewed and approved by the University of Wollongong Human Research Ethics Committee (approval number: 2024/050).

Respondents

A total of 333 people responded to the survey, 30.6% (102) were consumers (i.e. members of the general public) and 69.4% (231) were stakeholders involved with physical activity, sedentary, and/or sleep behaviour, or health and wellbeing more broadly, in a professional capacity. The majority of stakeholders reported to be involved in the following sectors (can select >1): Healthcare (153), Public Health Promotion and policy (109), research (62), sport (34), aged care (31), and disability (30). A potential limitation of the sampling method is that the respondents may not be representative of the broader population, which could limit the generalisability of the findings to the wider Australian public.

Perception of the recommendations

- 80.6% of stakeholders responded that integrated 24-Hour movement guidelines were useful in comparison to separate guidelines for physical activity, sleep and sedentary behaviour.
- 70.7% of stakeholders agreed that a statement on number of steps per day would be a useful addition to the current physical activity recommendations.
- Support for recommendations on sleep and integrated behaviours, which have not previously been included in Australian guidelines for adults and older adults, were high. In total 84.3% of stakeholders and consumers combined agreed that the Canadian integrated recommendation was clear and 95.5% of stakeholders and consumers agreed that the Canadian sleep recommendations for adults and older adults, were clear.
- When presented with a choice between stating the moderate- to vigorous-intensity physical activity (MVPA) recommendation in minutes per week or hours per week, stakeholder respondents preferred the recommended dose to be stated in hours per week (74.7%). Similarly, respondents (81.7%) preferred the dose to be specified per day rather than per week with one respondent noting: "*A daily exercise target (e.g. 30 minutes moderate/vigorous exercise per day) works better for most patient groups. E.g. most stroke/TBI patients are very unlikely to be able to calculate, and reflect on total physical activity across a week. Needs to be easier to interpret and set as a goal for all patients."* 70% of consumers surveyed responded that the MVPA recommendations when expressed as minutes per day was the most easily understood. This was considered, and the draft recommendation modified to include "Moderate- to vigorous-intensity physical activities for 30-minutes or more on most days, such that there is an accumulation of 2.5 hours or more per week."
- Nearly two-thirds of stakeholders (63.4%) reported that they preferred the MVPA recommendation to specify a range of minutes rather than only a lower threshold. Whilst the Leadership Group considered this feedback, it was decided to remove the upper value of the range based on current evidence, including objective accelerometer data, indicating that there was a lower reduction in risk factors for additional minutes spent in MVPA above 150 minutes, and much less above 300 minutes. The wording "or more" was included to convey that there is no harm in aiming for more than 150 minutes per week.

Key qualitative feedback provided

Stakeholders and consumers provided useful written feedback on the example Canadian recommendations and how these could be adapted to the Australian setting. Common themes were the preference of simpler language that was more easily understood by a wider audience and providing specific examples of the types of physical activity to undertake to achieve the recommendations. The Consensus Panel agreed that the guidelines should be developed with the primary goal of accurately reflecting the current and highest quality evidence. The optimal language and communication for wide accessibility to the general public will be developed in the subsequent activation of the guidelines, which will also include a glossary.

2. a) Summary of the results of the public consultation on the draft recommendations and companion statements

The Department hosted a public consultation, conducted through their secure online citizen engagement platform *Citizen Space* on the Consultation Hub, from the 18th September 2024 to the 18th October 2024. Stakeholders and community members were presented with the draft guidelines and companion statements and asked for their feedback. A total of 69 responses were received, 32 responses from a consumer/individual and 37 responses from an organisation.

Overall, around two-thirds of respondents agreed that the draft guidelines were clear or very clear:

- 68% (43/63) responded in agreement for the Guidelines for Adults
- 69% (44/64) responded in agreement for the Guidelines for Older Adults
- 67% (40/60) responded in agreement for the Guidelines for People with Disability
- 63% (39/62) responded in agreement for the Guidelines for People with Chronic Conditions

An overwhelming majority (91%, 59/65) were supportive of the draft recommendations either as they were or with suggested amendments (which respondents were invited to provide via an open-ended text response in the submission). One consumer responded that *"The guideline promotes a balanced approach to health by integrating physical activity, reducing sedentary behaviour, and ensuring adequate sleep. This holistic framework enhances mobility, mental well-being, and overall quality of life."*

Key qualitative feedback provided

Many respondents expressed a desire for quantitative targets for light-intensity physical activity and sedentary time." One consumer noted *"Perhaps consider providing recommendations or guidelines for the max amount (mins or hours) of sedentary time. Just saying limiting may not [be] sufficient for people to follow."*

The Leadership Group discussed and agreed that in this instance we have been guided by the current evidence base, and where there was not sufficient high-quality evidence to determine a specific cut-off or dose-response we have refrained from specifying this in the recommendation.

2. b) Feedback from the Stakeholder organisation members of the consensus panel

The draft guidelines and companion statements were circulated to the stakeholder organisations that were members of the consensus panel for written feedback. Feedback was received from 21 organisations, and suggested amendments were taken into consideration by the Leadership Group in preparing the final draft version of the guidelines.

Stakeholders raised important queries on a number of points, including:

- How standing will be addressed in the guidelines. In response to this, the Leadership Group included a companion statement on standing to break-up sedentary behaviour. It was decided not to include standing in the recommendations as the current evidence on

standing alone is preliminary and inconclusive, and furthermore standing is not consistently considered a light intensity activity. The wording “where able” was included to acknowledge that not everyone can stand.

- How screen time will be addressed in the guidelines. Due to inconsistency in the evidence (i.e. detrimental effects have only been observed with some types of screen use) the Leadership Group decided to refrain from making a recommendation on hours of screen use, in favour of addressing this in the companion statements. Considering the suggested amendments, the sedentary behaviour companion statement has been reframed to simplify the message on sedentary screen use.

3. a) Summary of the results of the public feedback survey on the draft guidelines

The survey was conducted on the secure web-based database-management application, REDCap, and was open to the Australian public for feedback from 29th October 2024 to 25thNovember 2024. The anonymous survey link was distributed employing the snowballing method through key stakeholders and their communication channels. Respondents were asked about the clarity of each of the draft recommendations, companion statements and preamble for i) adults ii) older adults iii) people with disability and iv) people with chronic conditions according to which group they belonged to (the general public) or worked with (stakeholders). Respondents were also asked questions about the draft guidelines overall relating to their acceptability, feasibility and implementation. This research was reviewed and approved by the University of Wollongong Human Research Ethics Committee (approval number: 2024/050).

Respondents

A total of 467 people responded to the survey, 68.3% (319) were consumers (i.e. members of the public) and 31.7% (148) were stakeholders involved with physical activity, sedentary, and/or sleep behaviour, or health and wellbeing more broadly, in a professional capacity. A potential limitation of the sample size is that the respondents may not be representative of the broader population, which could limit the generalisability of the findings to the wider Australian public. Stakeholders were most likely to report being involved in the following sectors (could select >1): healthcare (89), public health promotion (48), research (32), aged care (27) non-governmental organisation (25) and State or territory government (24). Respondents were from all states and territories in Australia:

Location	Number (%)
Australian Capital Territory	33 (7.2%)
New South Wales	122 (26.6%)
Northern Territory	9 (2.0%)
Queensland	70 (15.3%)
South Australia	74 (16.2%)

Location	Number (%)
Tasmania	10 (2.2%)
Victoria	93 (20.3%)
Western Australia	47 (10.3%)

Sector	Number reported
Public health promotion	48
Healthcare; physical activity	45
Healthcare; other	39
Research	32
Aged care	27
Non-government organisation	25
State or territory government	24
Community group	23
Education	22
Public health policy	15
Local government	14
Recreation	11
Disability	10
Sport	8
Healthcare; sleep	5
Multicultural organisation	5
Transport	5
Other	3
Planning	1

Perceptions of the draft guidelines overall (all respondents)

number (%)	Combined agreement	Strongly Agree	Somewhat Agree	Neither Agree nor Disagree	Somewhat Disagree	Strongly Disagree	Total n
The Title is clearly stated	349 (92.1%)	239 (63.1%)	110 (29%)	14 (3.7%)	12 (3.2%)	4 (1.1%)	379
Do you agree with the Title?	298 (79.3%)	175 (46.5%)	123 (32.7%)	39 (10.4%)	30 (8%)	9 (2.4%)	376
The 24-Hour Movement Guidelines are clearly stated.	338 (89.9%)	216 (57.4%)	122 (32.4%)	17 (4.5%)	15 (4%)	6 (1.6%)	376
Do you agree with the 24-Hour Movement Guidelines?	350 (92.8%)	246 (65.3%)	104 (27.6%)	17 (4.5%)	5 (1.3%)	5 (1.3%)	377
The costs for you to use the 24-Hour Movement Guidelines are likely to be small or have little impact compared to not using the Guidelines:	242 (67.8%)	126 (35.3%)	116 (32.5%)	81 (22.7%)	22 (6.2%)	12 (3.4%)	357
The benefits of using the 24-Hour Movement Guidelines are likely to outweigh the costs.	280 (77.3%)	160 (44.2%)	120 (33.1%)	68 (18.8%)	9 (2.5%)	5 (1.4%)	362
Following the 24-Hour Movement Guidelines is likely to benefit all population groups equally, irrespective of gender, cultural or language background, geographic location, or socio-economic status:	287 (79.1%)	175 (48.2%)	112 (30.9%)	44 (12.1%)	24 (6.6%)	8 (2.2%)	363
The purpose of the 24-Hour Movement Guidelines are clear	328 (91.1%)	208 (57.8%)	120 (33.3%)	17 (4.7%)	12 (3.3%)	3 (0.8%)	360

number (%)	**Combined agreement**	**Strongly Agree**	**Somewhat Agree**	**Neither Agree nor Disagree**	**Somewhat Disagree**	**Strongly Disagree**	**Total n**
	Combined agreement	**Always**	**Frequently**	**Occasionally**	**Seldom**	**Never**	
Would you use the 24-Hour Movement Guidelines?	275 (72.6%)	97 (25.6%)	178 (47%)	81 (21.4%)	14 (3.7%)	9 (2.4%)	379
	Combined Easy	**Very Easy**	**Somewhat Easy**	**Neither Easy nor Difficult**	**Somewhat Difficult**	**Very Difficult**	
How easy or difficult would you find using the 24-Hour Movement Guidelines?	254 (69.6%)	122 (33.4%)	132 (36.2%)	45 (12.3%)	51 (14%)	15 (4.1%)	365
	Combined Useful	**Much More Useful**	**More Useful**	**Neutral**	**Less Useful**	**Much Less Useful**	
In comparison to separate physical activity, sedentary behaviour and sleep guidelines, do you find these 24-Hour Movement Guidelines...	256 (70.1%)	64 (17.5%)	192 (52.6%)	96 (26.3%)	8 (2.2%)	5 (1.4%)	365

A total of 348 survey participants (94.1%) responded “Yes” when asked if the 24-Hour Movement Guidelines were important to them, and 343 (91.5%) responded that “Yes” they would use the integrated movement behaviour guidelines. Survey participants were asked which groups these 24-Hour Movement Guidelines as written were appropriate for, according to their goals of providing evidence-based recommendations, (more than one option could be selected). Respondents were most likely to report that the guidelines were appropriate for all groups; health professionals, health organisations, policy makers, researchers, and the general public:

Guideline users	Number (n=357)
Health professionals	142
Health organisations	130
Policy makers	117
Researchers	112
The general public	101
All of the above	229

Ratings of the clarity of the draft guidelines for each population

Adults (18 – 64 years)

Respondents were consumers aged 18-64 years and stakeholders who worked with adults (18-64 years old)

number (%)	Combined agreement	Strongly Agree	Somewhat Agree	Neither Agree nor Disagree	Somewhat Disagree	Strongly Disagree	Total n
The physical activity recommendations are clearly stated	193 (83.5%)	90 (39%)	103 (44.6%)	10 (4.3%)	20 (8.7%)	8 (3.5%)	231
The sedentary behaviour recommendations are clearly stated	182 (80.2%)	112 (49.3%)	70 (30.8%)	13 (5.7%)	24 (10.6%)	8 (3.5%)	227
The sleep recommendation is clearly stated	206 (90.4%)	148 (64.9%)	58 (25.4%)	5 (2.2%)	13 (5.7%)	4 (1.8%)	228
The integrated recommendation is clearly stated	163 (73.8%)	88 (39.8%)	75 (33.9%)	20 (9%)	27 (12.2%)	11 (5%)	221
The companion statements are clearly stated	188 (87.0%)	108 (50%)	80 (37%)	9 (4.2%)	14 (6.5%)	5 (2.3%)	216
The companion statements are useful	201 (93.5%)	123 (57.2%)	78 (36.3%)	7 (3.3%)	4 (1.9%)	3 (1.4%)	215
The preamble is clear	192 (92.3%)	107 (51.4%)	85 (40.9%)	7 (3.4%)	7 (3.4%)	2 (1%)	208

Older Adults (65+ years)

Respondents were consumers aged over 65 years and stakeholders who worked with older adults

number (%)	Combined agreement	Strongly Agree	Somewhat Agree	Neither Agree nor Disagree	Somewhat Disagree	Strongly Disagree	Total n
The physical activity recommendations are clearly stated	212 (89.8%)	135 (57.2%)	77 (32.6%)	10 (4.2%)	11 (4.7%)	3 (1.3%)	236
The sedentary behaviour recommendations are clearly stated	212 (91.8%)	142 (61.5%)	70 (30.3%)	9 (3.9%)	9 (3.9%)	1 (0.4%)	231
The sleep recommendation is clearly stated	219 (94.0%)	165 (70.8%)	54 (23.2%)	9 (3.9%)	5 (2.1%)	0 (0%)	233
The integrated recommendation is clearly stated	202 (87.4%)	111 (48.1%)	91 (39.4%)	8 (3.5%)	17 (7.4%)	4 (1.7%)	231
The companion statements are clearly stated	209 (92.9%)	132 (58.7%)	77 (34.2%)	7 (3.1%)	6 (2.7%)	3 (1.3%)	225
The companion statements are useful	210 (95.0%)	142 (64.3%)	68 (30.8%)	7 (3.2%)	3 (1.4%)	1 (0.5%)	221
The preamble is clear	200 (93.0%)	119 (55.3%)	81 (37.7%)	9 (4.2%)	4 (1.9%)	2 (0.9%)	215

Adults and Older Adults with Disability

Respondents were consumers with disability aged over 18 and stakeholders who worked with adults with disability

number (%)	Combined agreement	Strongly Agree	Somewhat Agree	Neither Agree nor Disagree	Somewhat Disagree	Strongly Disagree	Total n
The physical activity recommendations are clearly stated	69 (81.2%)	33 (38.8%)	36 (42.4%)	8 (9.4%)	6 (7.1%)	2 (2.4%)	85
The sedentary behaviour recommendations are clearly stated	73 (89.0%)	49 (59.8%)	24 (29.3%)	4 (4.9%)	5 (6.1%)	0 (0%)	82
The sleep recommendation is clearly stated	72 (91.1%)	49 (62%)	23 (29.1%)	4 (5.1%)	3 (3.8%)	0 (0%)	79
The integrated recommendation is clearly stated	71 (83.5%)	42 (49.4%)	29 (34.1%)	5 (5.9%)	8 (9.4%)	1 (1.2%)	85
The companion statements are clearly stated	74 (87.1%)	44 (51.8%)	30 (35.3%)	4 (4.7%)	7 (8.2%)	0 (0%)	85
The companion statements are useful	74 (88.1%)	47 (56%)	27 (32.1%)	6 (7.1%)	4 (4.8%)	0 (0%)	84
The preamble is clear	74 (89.2%)	38 (45.8%)	36 (43.4%)	5 (6%)	4 (4.8%)	0 (0%)	83

Adults and Older Adults with Chronic Conditions

Respondents were consumers with chronic health condition(s) aged over 18 and stakeholders who worked with adults with chronic health conditions

number (%)	Combined agreement	Strongly Agree	Somewhat Agree	Neither Agree nor Disagree	Somewhat Disagree	Strongly Disagree	Total n
The physical activity recommendations are clearly stated	141 (88.1%)	75 (46.9%)	66 (41.3%)	8 (5%)	11 (6.9%)	0 (0%)	160
The sedentary behaviour recommendations are clearly stated	145 (91.8%)	90 (57%)	55 (34.8%)	7 (4.4%)	6 (3.8%)	0 (0%)	158
The sleep recommendation is clearly stated	144 (90.0%)	103 (64.4%)	41 (25.6%)	10 (6.3%)	6 (3.8%)	0 (0%)	160
The integrated recommendation is clearly stated	139 (87.4%)	86 (54.1%)	53 (33.3%)	9 (5.7%)	11 (6.9%)	0 (0%)	159
The companion statements are clearly stated	142 (91.0%)	87 (55.8%)	55 (35.3%)	6 (3.8%)	8 (5.1%)	0 (0%)	156
The companion statements are useful	142 (94.7%)	92 (61.3%)	50 (33.3%)	2 (1.3%)	6 (4%)	0 (0%)	150
The preamble is clear	136 (91.9%)	82 (55.4%)	54 (36.5%)	7 (4.7%)	5 (3.4%)	0 (0%)	148

Qualitative feedback provided from the survey

Survey respondents (n = 467) had the opportunity to provide text responses to open-ended questions on the survey soliciting comments on the preamble, recommendations, companion statements, or the guidelines overall for each population. Key themes were identified from the 1333 responses received:

Similar to previous phases of consumer engagement, many respondents felt that the guidelines used technical language that might not be easily understood by the general public:

- *"The guidelines need to be written in a way that is low health literacy friendly and usable by those not from English-speaking backgrounds."*
- *"Please simplify and use simple/plain language. If they are 24-hour guidelines, all recommendations should be in minutes/hours (no days)."*

Likewise, respondents expressed a preference for more specific guidance on how often to break up sedentary time and what constitutes prolonged sedentary behaviour, and several hours of light intensity activity:

- *“very non-specific advice - consider timeframes, stronger recommendations e.g., standing every hour in desk-based jobs etc."*
- *“Several hours of LPA is a bit vague - some may interpret this as 3 hours, some may interpret it as 13 hours”*

Some participants queried the inclusivity of terminology for people who had health concerns:

- *"Qualifying that some people require rest to manage fatigue. 'Sedentary' may have stigma and negative connotations and knowing that for some people sedentary behaviour is necessary."*

Some respondents found the weekly recommendations confusing in the context of the "24-hour” movement guidelines:

- *"My only concern is the title '24-hour movement guidelines', is confusing as the recommendations speak to how much physical activity should be done throughout the week."*
- *reference to 24-hours, as well as 'per week' is confusing, it is not clear what several hours of LPA refers to: 24h or week?*

There was a desire among many respondents for clear definitions of terms used and examples, including:

- *sedentary behaviour*
- *light-intensity physical activity*
- *moderate-intensity physical activity*

- *vigorous- intensity physical activity*
- functional *activity*
- *Muscle-strengthening activities*
- *Integrated*
- *mobility exercises*
- *main muscle groups*
- *Good quality sleep*

Respondents raised considerations in the dissemination and implementation of the guidelines, and suggestions for the development of public-facing resources. These have been summarised in section 4 (page 106).

3. b) Draft summary of the results of the focus groups

Online focus groups of 6-8 people were held with consumers from each priority population; Aboriginal and Torres Strait Islander people; people living with disability, people living with chronic conditions; and people from a culturally and linguistically diverse (CALD) background. Participants were recruited from flyers distributed by stakeholder organisations to consumer groups, and from facilitator networks. Interested participants completed a screening questionnaire and were then contacted by a researcher and invited to take part in a focus group. A total of 8 groups were held. Participants were provided a copy of the draft Australian 24-Hour Movement Guidelines prior to the sessions and participated in a group discussion guided by a facilitator following an interview guide with prompts asking about the acceptability and usability of the guidelines. Focus group facilitators had experience working with the communities that they were interviewing, in the case of the focus groups with Aboriginal and Torres Strait Islander people, Aboriginal and Torres Strait Islander researchers conducted the interviews. Interviews were transcribed and checked for accuracy, with key themes and insights summarised. This research was reviewed and approved by the University of Wollongong Human Research Ethics Committee (approval number: 2024/282), and the Aboriginal Health and Medical Research Council (approval number: 46872337).

Participants

Focus groups have been completed with 54 members of the public. These included people who self-reported as being from CALD backgrounds (24%), people with lived experience of disability (26%), and chronic conditions (50%), and people of Aboriginal and Torres Strait Island origin (39%). The majority of participants were female (54%) with 39% male and 4% non-binary. The age range of participants was 21 – 67 years and the participants as a group spoke 11 different languages at home. The majority (59%) lived in major cities, with 15% living in regional areas, and 6% living in remote areas.

Qualitative Feedback from end-users from a CALD background

<u>Ensuring comprehensibility of the physical activity guidelines</u>

Usability/Practicality

Participants explained that a common recommendation is to aim for a certain number of steps but as highlighted: *“not everybody has got this tracker”*. Step counts alone can feel a bit abstract or even discouraging if unsure of what they really mean in the context of individual’s daily routine. Therefore, it is important to give practical advice in terms of time or simple actions a person can take during the day: *“I was going to say like, how far can you go with 7,000? But you said 20-minute walk..."*

Participants also reflected on the role of regular breaks to prevent prolonged sitting, whether in occupational or educational settings. They highlighted that the understanding and application of break-taking practices vary depending on individual backgrounds and exposure to Occupational Health and Safety (OH&S) principles: *“Having breaks like if your work is sitting down every 10 to 20 min or 30 min, you go for a 5 min break, or maybe, if you're a student, you've been told to take a break every so often. So, bearing that in mind, the interpretation of that is open, based on the background of the person with OH&S* Principles*”.*

Some participants sought clarity through concrete examples of sedentary behaviours. Rather than focusing solely on definitions, they expressed a need to understand what sedentary behaviour looks like in everyday life and how it might be reduced: “*So, watching TV is an example of it. Being on the computer is an example of it. But what does it actually look like? We can avoid doing”.*

Clarity and accessibility

Participants also reflected on the importance of language and accessibility when communicating information on sedentary behaviour. There was a strong emphasis on using plain English and culturally appropriate formats to ensure understanding across diverse communities. One participant noted that even the word "sedentary" itself can be difficult to grasp: “*I think it's a good opportunity really to look at the language again, because sedentary is such a big terminology. This is a good example of an area where we can apply the healthy literacy principle of plain English. So even pronouncing it to even with some of us is difficult. Can you imagine someone, you know, like some of the communities that we support? It's such a big word”*.

Several participants raised concerns about the clarity and accessibility of the terminology used in physical activity guidelines. In particular, terms such as "moderate" and "vigorous" intensity, as well as "functional activity," were described as vague or unfamiliar to those without a background in health. Participants highlighted the need for clearer definitions or examples to make the guidelines more interpretable. Additionally, questions were raised about how the strength of certain recommendations was determined, with some participants unsure whether classifications such as "strong" or "moderate" were based on evidence or subjective judgment: *“Was that just based on like your personal opinion? Or did you have any kind of metric.”*

Participants emphasised the importance of clear, visually engaging materials to support understanding of physical activity guidelines, particularly among individuals from CALD backgrounds. Several noted that dense, wordy text could be difficult to process even for those fluent in English: “*The sentences were so wordy they didn't really flow, so I had to stop*

and read them very slowly to get the understanding, and I'm fluent in English", suggesting that visual aids such as graphics, charts, or tables could improve both comprehension and engagement: "*It will come across a lot better when you put graphics, you know somebody exercising and then going to sleep, and then going into bed".* These reflections highlight a broader concern with health literacy and inclusive communication.

More diverse examples of physical activity

Participants emphasised the importance of recognising culturally relevant and non-traditional forms of physical activity when promoting movement and exercise. They noted that many people may not relate to structured or conventional sports but are still highly active through alternative practices such as dancing or Tai Chi: "*See if you give me dancing. I'll do the dancing all day, you know. But don't tell me to go to the gym, so forget it".* These reflections pointed to a need for broader, more inclusive definitions and examples of physical activity.

Participants also highlighted the need for more inclusive and flexible approaches to physical activity guidance, particularly for individuals with physical limitations such as older adults or those living with mobility impairments. There was a strong emphasis for alternatives to traditional recommendations like walking, with suggestions that modified exercises such as chair-based movements be clearly outlined: "*You know how now a lot of people are looking at these chair exercises especially when you're older you start moving your legs, and that maybe offer an alternative if unable to do the walking, so maybe an alternative is good".*

Participants also reflected on the gap between time spent in bed and actual sleep, particularly noting the influence of screen time and digital device use on sleep quality. There was a recognition that simply allocating time for sleep was not sufficient, and that clearer guidance around bedtime routines including limiting phone use could help. As one participant explained: "*Yes, I was, going to say, allowed enough time in bed. So, you go to bed like 8 o'clock or 9 o'clock. But you're on the phone. 2 h, so maybe you should add just, you know, remove yourself away from you know".*

Participants raised important points about how perceptions of "good quality sleep" can vary greatly depending on individual health conditions, age, jobs or lived experience. For some, medical issues such as sleep apnoea or age-related disruptions (e.g., frequent night-time bathroom use) significantly affect sleep patterns, yet these individuals may still view their sleep as sufficient: "*different people, may have a different definition or interpretation of a good quality…"* Participants expressed a desire for more concrete and practical sleep-related recommendations, including clearer tips around sleep hygiene: *"…some tips associated with the companion statements. It can be a bit more explicit. Okay, like avoiding caffeine before [sleep]? Like after 6 pm"* and age-based sleep consideration advice: "*It's good to actually break down the age groups".*

<u>Capacity, opportunity, and motivation to make use of guidelines</u>

Incentives

Some participants discussed the role of financial incentives, such as government issued activity vouchers, in promoting participation in sport and physical activity. They noted that while cost can be a barrier to engagement especially with club memberships or structured

programs, targeted subsidies may help reduce this burden for those who are motivated to participate. Importantly, it was acknowledged that such incentives tend to be self-selecting, meaning that only those actively seeking opportunities are likely to benefit. As one participant described: "*I think I would be incentivised to go to join a membership or club a sporting organisation. If there were ways to help reduce those costs in registering it might help me be more motivated to pursuing, but also those vouchers are available if you apply for it".*

Social engagement and motivation

Participants highlighted the role of personal motivation and social support in sustaining physical activity, especially among individuals facing health challenges or adapting to new cultural environments. One participant shared a personal journey of overcoming severe physical limitations through discovering an enjoyable form of exercise within a supportive group, emphasising the importance of finding activities that they like: "*try and find something you like or could like in the future, or something you can do with friends."* They also suggested the value of targeted recommendations and community resources to facilitate social engagement and physical activity, particularly for people from CALD backgrounds: *"I think it would be good if we can have some recommendations on, like how we can join some social groups, or if there is any resources that they can provide to that community, to basically motivate them, to do something instead of staying home, because solely they don't have the resources available for the community".*

Qualitative feedback from end-users with lived experience of disability or chronic conditions

<u>Clarity/Comprehensibility</u>

Participants found that key points in the recommendations and companion points were generally clearly stated and comprehensible, but that some key terminology was unclear. Terms such as *moderate-to-vigorous* intensity, balance, flexibility, and muscle-strengthening activities required definitions. Although the English used was generally perceived as simple and mostly free of medical jargon, participants felt that further simplification could enhance usability for diverse audiences including for different cultural and socioeconomic groups: *"It could be brought down to simpler terms."*

Structurally, the information in the guidelines was perceived as dense, overwhelming, and in need of better organisation. One participant remarked, "It's very wordy and it's a lot, so I would like to see the text broken up". Participants noted that some text in the recommendations was repeated in the companion points and that the companion points functioned as a list of points rather than having a logical or progressive flow: *"Overall there's repetition of information but not in a logical sequence or step-by-step guide"*. They suggested restructuring with numbered sections to facilitate referencing other sections (e.g. 'See point 5'): *"the body of the guidelines should be numbered to avoid repeating information."*

Although participants were informed that these guidelines are primarily aimed at health professionals they expressed confusion about this during the discussion. They argued that the guidelines themselves should clearly define the target audience, be it health professionals, the general public, or people with specific conditions, and that the text could

be rewritten with the target audience more clearly in mind. As one participant noted, *"I think it just has to be clear who the audience is. You're trying to be something to all people".*

Usability/Practicality for this population

Participants highlighted the importance of tailoring the guidelines to accommodate those with disabilities and chronic conditions. While information about progressive physical activity had been covered in the presentation about the guidelines that preceded the focus group discussion, it seemed that many participants failed to take this in. They stressed repeatedly that incremental physical activities are more manageable: "I find that I can achieve more, and achieve targets and activities when I break them up into smaller chunks".

There was also some confusion around the dosage of *"vigorous"* versus *"moderate" activity. As o*ne participant said, *"Vigorous sounds like it counts as the same as moderate"*. Thus, greater guidance was sought around how much moderate activity versus vigorous activity was required to achieve the same outcomes. Some wanted distinct sections within the guidelines that would provide guidance on specific forms of physical activity including each task's optimal duration and instructions on optimal performance.

There was confusion and mixed reactions to the flexibility of the guidelines. Flexibility was seen as crucial by some participants who needed options that were responsive to the variability in their disability and chronic conditions and fluctuations in daily physical activity capacity and sleep caused by issues such as chronic pain: *"I need this as a reference tool and I need to pick and choose what's best for me"*. Flexible guidelines also took account of physical limitations caused by disability or chronic conditions that could hinder access to exercise without the right equipment. Others voiced concerns about the guidelines being too general and not specific enough for individual needs: *"I want something specific to my condition and specific to my time".* Many wished for the inclusion of personal examples of physical activity that are more relatable to their individual health needs. One participant mentioned, *"Companion points suggest individualising personal situations, but the suggested physical activity is ridged."* However, those who wanted specific guidance also seemed less aware that these guidelines were primarily targeted at health professionals, reflecting the confusion about who these guidelines are written for.

The current recommendation of 2.5 hours physical activity a week, was seen as intimidating and unfeasible for beginners or those with significant physical limitations, with a preference for starting small and gradually increasing activity levels. One participant remarked, *"2.5hrs is hard to commit to, if unachieved, there's a sense of 'let myself down.' Every day is different."* They recommended providing both general guidelines and lighter options to cater to varying abilities, ensuring the guidelines encourage rather than discourage. One participant pointed out, *"There is so much variation in all of us. I think that needs to be respected [in final product.]"*. Others felt the 2.5 hours recommendation provided a clear goal and that *"evidence is evidence"* so there was no scope for adjusting the recommendations themselves. They argued the companion points could provide greater support for people with disability and chronic conditions about how to approach this goal, including working with health professionals to tailor activity programs appropriately.

This feedback has been incorporated into the evidence to decision process for these groups and informed minor word changes to the preamble and companion statements.

Qualitative feedback from Aboriginal and Torres Strait Islander end-users

Clarity/Comprehensibility

Participants emphasised the necessity of explicit examples to enhance clarity.

"I think it would have been nice for you to list out activities that classify as moderate or vigorous intensity. It also helps us to know on what to engage on whether it is weightlifting, is jogging, is it working and the muscles training strengthening activities."

"… I don't think everybody will actually know whether moderate intensity physical activities are."

Some participants also suggested that simplifying the language would aid comprehension.

"If we could use a simpler term for people who would not be sure of the meaning as…it could be interpreted in two different ways or more."

Participants also wanted explanations regarding the classification of different physical activity intensities.

"Where does one draw the line exactly between mild, moderate and high intensity?"

"Now the grading, is it based on the length of time or if you do a mild intensity for an extended period of time, can we call that moderate intensity because of big duration? I think some explanation needs to be included that so people can be very much aware of what they are doing at a particular time."

Achievability of the guidelines

Participants shared varied perspectives on the feasibility of adhering to the guidelines. While many believed the recommendations were achievable, they acknowledged that support structures would be essential, particularly when progressing to moderate or vigorous activities.

"Let's just say I want to start with some light intensity activities, probably I might not need any assistance for that. That's why I said it is necessary to include those activities. Like examples of those activities, but … the moderate exercises, maybe an instructor or something like that [is needed] to start up with something like that."

The availability of health professionals and community support was identified as crucial for sustained engagement.

"Having health professionals around while you're starting activities is a good idea, especially for those who might struggle to do it on their own."

"So, I think the type of support that checks in time and again to maybe better your experience or help you get better at something would be super useful. I mean, not the type that bothers you too much or set unrealistic overwhelming goals, but the type that is there to you know

your way that someone cares if you, you proceed or you if you have a relapse or something that kicks you out of the game."

Community-based activities were also seen as an effective way to encourage participation. Participants considered group activities as a positive form of achieving physical activities.

"Some people might be a bit shame of exercising in public so they can make it out of the view or if people don't care and they're like group sessions and they can organise group sessions."

"I'm just thinking about the group work that we found useful, you know, getting up early in the morning and walking in groups and then walking a bit further or as you got better, you're walking faster. I'm just thinking about how could we incorporate group work?"

Barriers to Physical Activity

Participants recognised the importance of physical activity for overall health and many highlighted its role in longevity, stress reduction, and disease prevention.

"You can't talk about good health without talking about exercise. It plays a role in every aspect of healthy living."

"If you incorporate exercise into your daily life and do it consistently, it increases your chances of maintaining a healthy life and even enhances recovery from illness."

Several barriers to physical activity were identified, including limited access to facilities and resources, high costs, environmental constraints, language barriers, health conditions and social support concerns. Environmental challenges such as extreme heat and dangerous wildlife were also highlighted.

"I feel like wanting to start at a gym. If for example, I have an access to a gym, I would like an instructor so I know what I'm doing or I'm sure that I'm not doing the wrong thing."

"What would make it a lot easier is having access to resources like gyms or even free access. That would encourage someone to start or engage."

"So, there are times when I'm well where I can walk an hour a day and do my housework, and all that is good. There are times when if I am sick and other things are emerging now like arthritis in my knuckles, so that makes a bit more difficult for me to do housework. But as we're ageing or we have other comorbidities, then our physical fitness is a bit up and down."

"As well as outside of having an instructor, maybe being in a group of people that visit the gym for how however frequent that might be, that's supposed to encourage me to keep going when sometimes I don't want to show up, you know, so that's important."

"That's just going to make it a hold up, just more difficult because then you need an interpreter and just makes it sometimes less interesting. Having to repeat everything that you say, if in the case that in the community English is not the first language, is going to make it more difficult than it would be normally just relating or giving out the instructions."

4. Stakeholder suggestions for implementation and dissemination

Qualitative feedback from all phases of stakeholder consultation on the implementation and dissemination of the guidelines have been summarised below:

Further information that respondents suggested be incorporated in the supporting public-facing documents included:

- *“How to integrate into daily life, i.e. examples of a 24-hour period, or week following the* guidelines*.”*
- *“Include gardening and housework under a heading as many clients state as their key physical activity”*
- *“how individuals can measure intensity e.g. how puffed they feel, (breathless, able/unable to speak in sentences etc).”*
- *“Walking, wheeling and riding are great examples of daily movement”*
- *“*how *to break up sedentary behaviour”*
- *“List important health benefits for motivation.”*
- *“Information on preparation for a good night's sleep."*
- *"It would be good to have breakout information so that people understand the term 'good quality sleep.'"*
- *"It would help me to implement these recommendations if there were further information provided such as online videos showing exercise and maybe affordable gym memberships."*

Respondents noted the following considerations in developing public-facing documents:

- *“replace the term physical activity with movement throughout the document. A description of the terminology for "movement" and a description of the terminology of physical activity. This would address the health literacy aspect.”*
- *“*Use *visuals/simple graphics.”*
- *“Development of additional information will be provided to support community members action the guidelines (i.e. website and resources)”*
- *“Could benefit from further messaging re. accumulation of physical activity via multiple bouts of activity under 30mins (e.g., active transport). Greater clarity that 30 minutes/day of MVPA doesn't have to be achieved in a single bout - Encouraging those that don't believe they have the time to still perform physical activity throughout their day.”*
- *“Work with disability groups to see how the information can be presented for different groups”*
- "*I think the language should be simplified for the general public and translated to minority groups in as many languages as possible."*

Include reference to existing resources:

- *“references to professional guidance (e.g. AUSactive, ESSA) for readers.”*
- *“currently no reference to referral schemes, funding, or social prescribing for older adults.”*
- “*a link to website that hosts directories for professional tailored advice to increase confidence of participants partaking in physical activity* (relating to Guidelines for Adults with Disability and Chronic Conditions)”

Respondents emphasised the need for supportive environments and resources to help people follow the guidelines.

- *"For the general public to put them into action - supportive environments need to be considered for cost-effective exercise programs to be established to be available and relevant for older adults."*
- *"Regional centres need more resources to be able to follow the guidelines."*
- *"Offering more examples and ways to incentivise physical activity would be valuable."*

Respondents raised the following points to consider in the promotion of the guidelines:

- *“The inclusion of sleep and several hours of physical activity are important additions in the context of healthy behaviours and reduced risk of health complications, and should be emphasised as additions during publication and promotion.”*
- *“In community, guidelines often fall flat due to barriers. Key barriers to physical activity (education, definitions, safety, conceptions, support systems etc.) should be addressed prior to providing recommendations.”*

Considerations for communication, messaging and implementation for Culturally and Linguistically Diverse people

Communication and messaging

Purposeful and targeted communication of the guidelines is important to consider, similar to *“the stop smoking recommendations which comes on TV while they are watching TV. If it comes as a pop up.* or *then when or in the radio, when you listen to the radio, it comes up”*. There are other important avenues to consider when disseminating the guidelines to culturally and linguistically diverse communities, for example: *“there is also a group of people that may benefit from the local news. Like, for example, when I was in some of the local Chinese community, they have got their newsletter that usually was stocked outside Coles, and majority of them, they would go very early in the morning and pick up those local newspapers.* There are other possible authoritative, or sources which can be viewed as more legitimate to disseminate the physical activity guidelines including: *“You know the doctor. Send it to the doctor's office, or Roads Maritime Services, or Centrelink*.

Given the broad age range targeted in the physical activity guidelines, it would be purposeful to consider early dissemination like: “*other health behaviour program starts to educate them from the high school age. Like the school age people. They can bring the message back to the family.”* The use of social media in dissemination and targeted campaigns might be helpful to reach a larger audience however, it is important to consider misinformation: “*I was*

just going to say, this lot of misinformation online. So, if it's on social media, I probably won't believe it. That much. So, yeah, probably community centre or someplace or health profession or university even".

To better engage and capture the community, the use of catchy slogans and messaging similar to other public health campaigns might be useful, for example: "*physical activity and sleep hasn't been quite as effective as say, like the Slip, Slop, Slap campaign about sun safety. There's nothing really catchy about it [the physical activity guidelines]"*. These outcomes can be guided by consultation with target groups and members of the community prior to dissemination and communication. This can include: *"word of mouth, surprisingly, was a very strong tool for the participants who actually participate in Park Run".* Other considerations are ensuring diversity in the represented age groups in consultation: "*because if you are looking at young people, for example, they use TikTok, for example. You know, if you want to reach them, maybe TikTok would be the way to go about it, or maybe Instagram or Snapchat. You know those are some of the avenues they may use for, maybe older, you know, mature adults. I don't know whether I can define that, but you know more mature people, adults, for example, they are more constantly using, for example, things like Facebook, for example. And also, there is also a group of people that may benefit from the local news.*

Considerations for communication, messaging and implementation for people with disability or chronic health conditions

Communication and Messaging

Participants highlighted the importance of effective communication and engaging messaging that promote the physical activity guideline recommendations. Simple and encouraging phrases like *"Move more, sit less"* and *"Taking care of your health starts with small steps"* were suggested. They suggested that that the guidelines prominently contain the key message that *"'Something is better than nothing', to encourage gradual progress".*

They emphasised that the guidelines should be visually appealing, using images, infographics with bold colours, 'how to' illustrations of physical activities, and possibly videos, to make the information more accessible and engaging: *"Videos/pictures to help engage and walk through information"*. One participant stated, *"I need to see it. I want to be inspired as well as educated".* Participants suggested that inspiring sources for promoting the guidelines could include the use of successful sports people, content creators, and social media influencers with disabilities and chronic conditions: *"Have sporting heroes promote PA and tell the public that they are important too".*

There was a preference for information to be available online, through websites, and on social media platforms like TikTok and Instagram: *"Social media makes it easy to reach more individuals".* They tended to agree that, *"It's a digital age [and] most people get their information online".* However, ensuring that the guidelines are perceived as trustworthy was also crucial, with suggestions that promotion of the guidelines should include research-backed evidence and verified health professionals: *"create trust with the information source clearly identifiable on page".* They highlighted the need to link to credible platforms such as government websites to build trust and ensure the information is accurate and reliable:

“Information online can be fake or be involved in controversies/misinterpretation”. They advocated for the role of health professionals in communicating and advising on the guidelines, with calls for public awareness campaigns similar to anti-smoking initiatives: *[We need] “Public awareness campaigns [that highlight the] advantages of consistent physical activity”.*

Ultimately, participants voiced a desire for communication strategies that are motivating, inclusive, and easily accessible, ensuring that everyone, regardless of ability or health condition, can understand and benefit from the guidelines.

Guideline access and support (Implementation Support)

Participants expressed the need for support in implementing the physical activity guidelines, especially for individuals with disabilities and chronic health conditions.

Accessibility was a key consideration. Participants stressed the importance of translating guidelines into different languages and adapting them for various cultural and socioeconomic groups. They stated the importance of having multiple access points to information, including Telehealth, online programs, health and community websites, and brochures/print material in libraries and local community centres They also expressed the need for offline accessibility, such as downloadable audio loops for visually impaired individuals and printed materials for those who are not tech-savvy: *“Guidelines need to be translated into audio loops for visually impaired community”.*

Participants suggested that the practical implementation of physical activity guidelines for people with disabilities and chronic conditions might require additional supports compared to the general population. They might need help identifying modifications to physical activities and creating realistic, adaptable schedules which meant having to change their lifestyles. Again, there was emphasis on the need for progressive physical activity: *“Guidelines should tell us to start with small amount of physical activity.”* Overall, there was an agreement that the guidelines could be more specific and supportive, highlighting the diversity and variability within these populations while ensuring the information is easily understandable and actionable.

Finding motivation and building in accountability were key concerns, with suggestions for promoting the guidelines through verified social media influencers, sporting heroes, and content creators with disabilities and chronic conditions who could inspire others. One participant advocated for, *"Promoting people with PWD/CHC doing physical activity on social media”*. Another talked about the use of powerful narratives as a motivational device: *“Storytelling. I think it's a wonderful way to encourage others. A psychological form of encouragement that keeps people going”.* The participants who had suggested public health campaigns said they should not only emphasise the benefits of physical activity but also promote the important role of community and connection in sustaining physical activity.

Throughout the discussion, there was some confusion about the role that health professional might play in implementing these guidelines, despite having addressed this in the presentation that preceded the focus group discussion. However, all participants felt that health professionals had an important role to play. Participants wanted practical advice on

modifying activities to suit their individual needs and had confidence in the skills of health professionals to do this, but also noted that access to health professionals can be limited and consultations can often be too hurried to engage in conversations about physical activity and sleep. Thus, while the ideal scenario was one in which the guidelines were implemented via health professionals, some participants stated that this was not always the reality. Consequently, the guidelines needed to be accessible, clear and usable for everyone.

Considerations for communication, messaging and implementation for Aboriginal and Torres Strait Islander people.

Communication and Messaging

Several participants emphasised the need for visual aids, such as images or graphics, to enhance engagement and comprehension.

"Visual aids, such as examples of exercises depicted through images, would reinforce the information provided in the guidelines. You want something that is easy, relatable, and not difficult to understand or overwhelming."

“I think it would also make more sense if we could add a kind of picture presentation here, like graphics to these activities. You know, it will also help to explain better and be more illustrative.”

Participants also recommended a comprehensive list of specific exercises categorised by intensity (light, moderate, vigorous) to remove ambiguity.

"Examples of activities would help, so we know what counts as moderate or vigorous."

Simplifying the language of the guidelines and translating them into other languages was seen as a way to improve accessibility, particularly for people whose first language is not English.

"If these guidelines were translated, more people in remote areas could understand them."

“I see the effort in trying to make these easily relatable or understandable. But again, I feel like we could use simpler terms, because again, looking at it, sometimes you want to interpret it in a different way and then you're not sure which of the different ways you can interpret it, that that's the context it comes in. So, I like that it's not bulky, it's not a very long, boring, maybe compound sentences, it is simple, but I think that we could do with simpler phrases to encourage better comprehension.”

Additionally, participants emphasised the importance of incorporating culturally relevant language and terminology and promoting the guidelines with a cultural title.

“But I think in terms of ownership that some language or, or some title in language is part of the ownership of the program. What's the message to them saying, you know, this is about you as well? It's not just about academics or people with high degree of understanding English. I think it's really, really important that you give the program a language name. And that's not hard to do, you know, in the communities that you work with.”

Providing examples of free or low-cost exercise options was another key recommendation.

“I think it's very essential to include those activities you can do without requiring money to do it because personally for me, I think the barriers would be access to an instructor and the accessibility to the equipment. So, I think it is very essential to include those activities you can do without requiring an instructor and money.”

Participants suggested incorporating activities that are relevant to some Aboriginal and Torres Strait Islander communities, such as traditional dance, fishing, or hunting, to align with cultural practices that already involve physical activity.

“Depending on where you live and what you've got access to, certain activities might be more relevant.”

“It's walking to get to the river, which is about 20 minutes from most people's homes. It's about, you know, walking around the river and getting bait and all sorts of things.… people when they go hunting kangaroo or looking for emu eggs. You know, there's a lot of walking when you're looking for emu eggs.”

“Just incorporating a lot of the day-to-day things that Aboriginal Torres Strait Island people do on a daily basis …like the activities around fishing, hauling in nets, all of the walking that's required, throwing nets, you get bait, all of those sorts of activities that should be explained to people that this is legitimate activity. You know, there's a lot of movement that happens and it's family oriented most of the time.”

“So, I think that we need to just be aware of what cultural activities are going on in communities and how you can legitimise, you know, it's a funny word to use, but you legitimise this to people that that's exercise.”

Some participants suggested developing a toolkit to empower healthcare staff in remote areas in implementing programs that align with the guidelines effectively.

“So, I just thought maybe a little separate piece of advice around implementation of the guidelines for the people who are going to be involved in running the program that could help them think about other activities that would fit in.”

Consideration for individuals with chronic health conditions and recommendations for consultations with health professionals regarding appropriate levels of physical activity were also suggested.

“But as we're ageing or we have other comorbidities, then our physical fitness is a bit up and down. So, I'm just saying that that's something that should be taken into consideration, that you can't always maintain the optimum level of activity when you're aging and different things are happening with your body. I just think there should be somewhere where people are aware of those changes that will impact your health.”

“Exceptions to the guidelines should be clearly stated. For example, post-surgical patients, people with connective tissue disorders.”

"Having health professionals around while you're starting activities is a good idea, especially for those who might struggle to do it on their own."

Guideline access and support (Implementation Support)

While the guidelines were supported, participants emphasised the need for clearer terminology, culturally relevant examples, and cost-free activity suggestions. They also recommended community-driven initiatives, engagement with relevant organisations and greater involvement of healthcare professionals in promoting adherence. community centres, programs and sporting events such as the Koori Knockout were specific suggestions of avenues to increase awareness and accessibility.

"Workshops and community centres would be a great way to introduce the guidelines."

"Getting stalls at places like the annual Koori Knockout in NSW for example, where a lot of community people go, where there are a lot of football players that you know the community absolutely adore and you can involve them in this process. I think people would, especially the younger generation would respond to that, sort of, understanding the information through that sort of environment."

"… examples about group work, some examples about how they could resource the programme by having some weights available in rural and remote Aboriginal communities where there's such a high level of unemployment that people aren't working. And you could build a program around that."

Videos, workshops, and online platforms were widely favoured over printed materials as more effective ways to engage with the community.

"A video would work really well. If you have someone talking and going through the guidelines with examples, people would respond better than just reading papers."

"*I'd suggest, as well as everything you've mentioned, a little video. Because a lot of Aboriginal health workers will respond better to watching a video than reading to papers. So, if you have someone talking going through the guidelines and maybe writing on a white board behind them, each one as they go along, and talking about examples of what the aim of that part of the guidelines is all about. I think people would respond better to that and just reading papers or looking at diagrams*."

Participants strongly emphasised the importance of incorporating the guidelines into health check-ups and health programs by ensuring that healthcare professionals are educated, equipped and empowered to promote and discuss the guidelines effectively with community members.

"And, as you're saying that, I'm thinking that a lot of Aboriginal health workers and practitioners are from the local community. So, they not only understand what's available, they understand what's worked in the past for their family and also what their family and community might be interested in doing anyway."

"And if we're talking about the NT examples, you know, working with AMSANT, the AMS Alliance NT, which is a peak Aboriginal Health Organisation in the Northern Territory. Be

good to give them a visit and go through the guidelines with some of their staff so they can be involved in advising on the different communities and their needs and what would be suitable for them."

"I think it would be good if you could get a bit of time at the NACCHO conferences to just run little workshops on the guidelines. I think we've use for all the new guidelines or the ones that are mostly used for chronic diseases now. There's so many people in their 40s and 50s every week dying out there. Places where I come from, you know, 3 funerals …in two weeks. The young women in their 40s and 50s, It's just shocking. So, you know, if you got time at a NACCHO."

"These discussions could be held with people during Well Persons Health. I just think it's a discussion that should be held along with taking, you know? The usual data around blood pressure and blood glucose levels, etcetera, that hopefully you could have to have that toolkit available. So, you're reaching more people, really doing the Well Person's Health Checks and you could just talk through the guidelines and if people are interested, give them more information."

"I would think that it would be useful if you were able to have a sheet with the guidelines. I'm thinking about working in rural areas where people are not, staff really have not responded much to guidelines or other things over the years that you could have a sheet for whoever's going to administer the program or be in charge of the chronic disease program or whatever. Just some directions for them."

"But it also needs to go through the organisation to the health workers where they need to run workshops and really go through the guidelines with them so they understand perfectly about what the aim of the whole thing is. And get in a discussion with them about how would people in this environment be able to or understand what opportunities they have for high intensity, whether it's jogging around the levy bank or whatever. Two other things, because it's mostly the health workers that the community people talk to. So that's why I always talk about empowering health workers so they can say, no, it's not really good that you're sitting there all day."

A community newsletter was also proposed as a means to encourage participation and awareness across different regions.

"…sometimes it's useful to have a little just basic newsletter with photos of people doing things because if you're sending photos from Weilmoringle and people in Burke and Brewarrina, oh, there's such and such. And this is what they're doing. And you know, we should do that here."

Participants also recommended engaging with Aboriginal and Torres Strait Islander organisations, schools, and voluntary groups to support the dissemination of the guidelines.

"Conference where you could run a workshop and go through guidelines, it's not just these guidelines, but everything to help."

"More public awareness seminars and workshops should be held to encourage the masses, as well as provision of incentives to boost participation."

“…just going to health conferences, especially the Aboriginal health conferences like the NACCHO conference and so on, could be a good platform for sharing this information.”

Annex 1: Rating of Perceived Exertion scale

RPE	Perceived Effort	Description
0	Nothing at all	*Resting, no exertion*
1	Very light	*Easy walking at a slow pace*
2-3	Light	*Comfortable, breathing slightly harder*
4	Moderate	*Breathing heavier, can still hold a conversation*
5-6	Somewhat hard	*Moderate effort, starting to feel challenged*
7	Hard	*Difficult to maintain, breathing heavily*
8	Very hard	*Very challenging, can only speak a few words*
9	Extremely hard	*Nearly maximal effort, very uncomfortable*
10	Maximal exertion	*Cannot continue, completely exhausted*

Borg, G. (1982). Psychophysical bases of perceived exertion. Medicine & Science in Sports & Exercise, 14(5), 377–381.

Annex 2: Guideline Development group

	Name	Organisation	State	Expertise
1	Anthony Okely (lead)	University of Wollongong	NSW	24-hour movement guidelines, guideline development
2	Monique Francois (Co-lead)	University of Wollongong	NSW	Content expert: Physical activity, priority populations, chronic conditions
3	Claire White (May 2023 – Aug 2024)	Australian Government, Department of Health and Aged Care	ACT	Agency representative
4	Claire MacNamara (Aug 2024 – current)	Australian Government, Department of Health and Aged Care	ACT	Agency representative
5	Jessica Tierney (Aug 2024 – current)	Australian Government, Department of Health and Aged Care	NSW	Agency representative
6	Louise Richardson (Aug 2024 – current)	Australian Government, Department of Health and Aged Care	SA	Agency representative
7	Peter Cistulli	University of Sydney	NSW	Content expert: Sleep
8	Yu Sun Bin	University of Sydney	NSW	Content expert: Sleep
9	Stuart Biddle	University of Southern Queensland	QLD	Content expert: Sedentary Behaviour
10	Dylan Cliff	University of Wollongong	NSW	Content expert: Screen time
11	Paddy Dempsey	Deakin University	VIC	Content expert: Physical activity and sedentary behaviour, Chronic conditions, guideline development

	Name	Organisation	State	Expertise
12	Melody Ding	University of Sydney	NSW	Content expert: Physical activity, Economic benefits
13	Kar Hau Chong	University of Wollongong	NSW	Content expert: Integrated Behaviours, compositional analyses
14	Cathie Sherrington	University of Sydney	NSW	Content expert: Older adults, Disabilities, chronic conditions
15	Leanne Hassett	University of Sydney	NSW	Content expert: Disabilities, chronic conditions
16	Anne Tiedemann	University of Sydney	NSW	Content expert: Older adults
17	Ray Kelly	University of Melbourne	NSW	Content expert: Indigenous populations
18	Rona Macniven	University of New South Wales	NSW	Content expert: Indigenous populations
19	Elizabeth Calleja	Heart Foundation	National	Dissemination, stakeholders & end-users
20	Zachary Munn	The University of Adelaide	SA	GRADE Methodology expert
21	Robert Ross	Queen's University, Canada	Canada	Lead of Canadian 24-hour movement guidelines for adults and older adults
22	Adrian Bauman	University of Sydney	NSW	Content expert: Physical activity and sedentary behaviour, guideline development
23	Trevor Shilton	University of Western Australia	WA	Translation into policy and practice
24	Rochelle Davis	University of Wollongong	NSW	Project manager
25	Rebecca Stanley (May 2023 – Mar 2024)	University of Wollongong	NSW	Stakeholder consultation

Annex 3: Guideline Consensus Panel

	Name	Organisation	Role
1	Anthony Okely (lead)	University of Wollongong	Development Group
2	Monique Francois (Co-lead)	University of Wollongong	Development Group
3	Claire White	Australian Government, Department of Health and Aged Care	Development Group
4	Peter Cistulli	University of Sydney	Development Group
5	Yu Sun Bin	University of Sydney	Development Group
6	Stuart Biddle	University of Southern Queensland	Development Group
7	Dylan Cliff	University of Wollongong	Development Group
8	Paddy Dempsey	Deakin University	Development Group
9	Melody Ding	University of Sydney	Development Group
10	Kar Hau Chong	University of Wollongong	Development Group
11	Cathie Sherrington	University of Sydney	Development Group
12	Leanne Hassett	University of Sydney	Development Group
13	Anne Tiedemann	University of Sydney	Development Group
14	Ray Kelly	University of Melbourne	Development Group
15	Rona Macniven	University of New South Wales	Development Group

	Name	Organisation	Role
16	Elizabeth Calleja	Heart Foundation	Development Group / Stakeholder Representative
17	Zachary Munn	The University of Adelaide	Development Group
18	Robert Ross	Queen's University, Canada	Development Group
19	Adrian Bauman	University of Sydney	Development Group
20	Trevor Shilton	University of Western Australia	Development Group
21	Rochelle Davis	University of Wollongong	Development Group
22	Rebekah Harrison	Department of Health Tasmania	Stakeholder Representative
23	Kate Robertson	NT Health	Stakeholder Representative
24	Sandra Pavey (formerly Kristen Clark)	Health and Wellbeing Queensland	Stakeholder Representative
25	Jane Potter	Department of Health, Victorian Government	Stakeholder Representative
26	Matt Cameron	Victorian Health Promotion Foundation (VicHealth)	Stakeholder Representative
27	Elaine Marshall	Western Australian Department of Health	Stakeholder Representative
28	Ros Knox	Preventive and Population Health, ACT Health	Stakeholder Representative
29	Peta Lucas	NSW Ministry of Health, Centre for Population Health, NSW	Stakeholder Representative
30	Gabrielle Fisher	Preventive Health SA	Stakeholder Representative

	Name	Organisation	Role
31	Jasmine Menant	Australia and New Zealand Falls Prevention Society	Stakeholder Representative
32	Kate Armstrong	National Aboriginal Community Controlled Health Organisation (NACCHO)	Stakeholder Representative
33	Nuria Alarcón Lopez	The Social Policy Group	Stakeholder Representative
34	Phil Hamdorf	Australian Sporting Alliance for people with a Disability	Stakeholder Representative
35	Rae Anderson	Disability Sports Australia	Stakeholder Representative
36	Deborah Inman	Australasian Sleep Association	Stakeholder Representative
37	Moira Junge	Sleep Health Foundation	Stakeholder Representative
38	Paul Gardiner	Public Health Association of Australia	Stakeholder Representative
39	Lucy Westerman	Australian Chronic Disease Prevention Alliance (ACDPA)	Stakeholder Representative
40	Corneel Vandelanotte	Asia-Pacific Society for Physical Activity	Stakeholder Representative
41	Elyse Hocking (formerly Judy Powell)	Allied Health Professionals Australia / Exercise and Sports Science Australia (ESSA)	Stakeholder Representative
42	Lindsey Reece	Sport Australia	Stakeholder Representative
43	Sam Bolton	Cycling and walking Australia and New Zealand	Stakeholder Representative
44	Carol Maher	Australian Physiotherapy Association	Stakeholder Representative
45	Elise Kennedy	Australian Bureau of Statistics	Stakeholder Representative

Annex 4: Summary of declaration of interest from Guideline Consensus Panel members

Consensus panel member	Declaration of Affiliations and Interests Form and Checklist
Adrian Bauman	I am an investigator on several grants in implementation science, community physical activity interventions and physical activity projects, and cardiac rehab trials, funded by NHMRC and MRFF ; I am a consultant to the World Bank on physical activity policy, and to Cancer Australia on sun protection campaign evaluation. I have participated in physical activity guideline development in the 1980s, 1990s and 2000s in Australia and elsewhere.
Anne Tiedemann	I am an investigator on several NHMRC and MRFF-funded trials of physical activity interventions for people aged 50 years and over.
Carol Maher	I have received numerous research grants related to increasing the Australian population's physical activity levels.
Cathie Sherrington	Investigator in trials of physical activity interventions in older adults and people with disabilities funded by NHMRC and MRFF and undertaken by staff and higher degree research students.
Claire White	None
Corneel Vandelanotte	- I receive funding from NHMRC, MRRF, ARC and NHF for research projects that involve the development, evaluation and implementation of interventions to promote physical activity, in this context I am also involved in clinical trials. - I receive funding from Health and Wellbeing Queensland and Preventive Health SA for the ongoing dissemination of the 10,000 Steps physical activity promotion program. - I am in the process of negotiating a contract with BUPA for the implementation of the 10,000 Steps program for their staff and customers. - I am the Founding Editor-in-Chief for the Journal of Activity, Sedentary and Sleep Behaviors (JASSB) this is a BioMedCentral (BMC – Springer-Nature) international peer-reviewed scientific journal that embraces the development of knowledge and research that adopts a 24-hour approach when examining or manipulating physical activity, sedentary and sleep behaviors and their effect on health. I receive a small honorarium from BMC as editor of the journal. - I am a Founding Executive Committee member for the Asia-Pacific Society for Physical Activity (ASPA). ASPA is a professional society to advance the science and practice of physical activity in Asia Pacific region. The Society provides a forum to bring together researchers, practitioners and policy makers to share expertise and experiences in the advancement of the field of

Consensus panel member	Declaration of Affiliations and Interests Form and Checklist
	physical activity. ASPA has funded my travel and accommodation costs to attend the consensus panel meeting. - I am a Fellow (and Past Founding Chair) of the e- & mHealth Special Interest Group of the International Society for Behavioral Nutrition and Physical Activity (ISBNPA). - I have published nearly 300 scientific peer-reviewed journal articles in the areas of physical activity, sedentary behaviour, sleep, diet, weight, and currently have about 20 manuscripts in progress. - I lead the Physical Activity Research Group at the Central Queensland University (CQUni). I receive a salary from CQUni as my full-time employer.
Deborah Inman	I have received honoraria from Astra Zeneca to prepare and deliver an educational talk on Anti-obesity pharmacotherapy (2023). I am a committee member for the National Association of Clinical Obesity Services (NACOS). I have given talks of an educational nature on the topics of Sleep and Obesity to conferences at National level (Australasian Sleep Association Short course in Obesity Management 2021, Australian and New Zealand Society for Metabolic Obesity Surgery 2023, and locally to trainees from medical student to registrar level, and to GP networks on topics related to obesity and sleep. I am currently involved in and may have future involvement in research in the fields of obesity management and/or sleep medicine. I do not consider any of these to pose real, potential or apparent conflict of interests related to Movement Guidelines.
Dylan Cliff	I am a Chief Investigator on the ARC Centre of Excellence for the Digital Child. I have co-authored the below paper arguing that screen guidelines should be separated from movement guidelines in children. Straker, L., Edwards, S., Kervin, L., Burley, J., Hendry, D., and Cliff, D. 2023 Digital Child Working Paper 2023-01, Moving screen use guidelines: Nine reasons why screen use guidelines should be separated from public health 24-hour movement guidelines in Australia and internationally. ARC Centre of Excellence for the Digital Child, Brisbane, Australia. https://www.digitalchild.org.au/workingpapers/moving-screen-use-guidelines-nine-reasons-why-screen-use-guidelines-should-be-separated-from-public-health-24-hour-movement-guidelines-in-australia-and-internationally/
Elaine Marshall	None
Elise Kennedy	I have nothing to declare

Consensus panel member	Declaration of Affiliations and Interests Form and Checklist
Elizabeth Calleja	1. Key contributor to National Heart Foundation of Australia Heart Foundation Walking Program. Current funding from Department of Health and Aging for 2023-2025 deliver Heart Foundation Walking initiative via the Healthy Hearts Initiative/ Preventative Health funding – no perceived conflict as funding is intended to implement physical activity guidelines as part of a public health awareness campaign of the program and the benefits of walking and physical activity. 2. Heart Foundation advocacy activities for ongoing funding of the program to deliver a population based physical activity programs at a national scale 3. Publications: a. Conference abstracts and publications that have been and will be written in 2023-2024 will be to showcase the activities and evaluation outcomes of Heart Foundation Walking Program. b. Blueprint for an Active Australia. The Heart Foundation will commence work on the revised edition of the Blueprint for an Active Australia in late 2024. Due for renewal in 2024, we will hold off activity on this piece of work until 2025 to ensure the guidelines are complete, and that the completed guidelines can inform the publication, and play a role in the dissemination from 2025.
Gabrielle Fisher	- President – Australian Health Promotion Association – SA Branch - Owner (Spouse) – The Running Company Adelaide
Jane Potter	None
Jasmine Menant	Currently co-leading the update of the National Falls Prevention Guidelines, commissioned by the Australian Commission on Safety and Quality in Health Care. Currently leading a clinical trial of an exergame step training program to improve symptoms, balance and quality of life in cancer survivors with chemotherapy-induced peripheral neuropathy.
Judy Powell	My husband owns and runs a small business Portable Buildings Cabins Offices Houses And Granny Flats New Used (prtindustries.com.au)
Kar Hau Chong	None
Kate Armstrong	No conflict of interest or affiliation to declare.
Kate Robertson	My spouse owns a bicycle shop
Kristen Clark	None

Consensus panel member	Declaration of Affiliations and Interests Form and Checklist
Leanne Hassett	Employee of The University of Sydney Member Australian Physiotherapy Association Received funding from NHMRC and MRFF to conduct research on physical activity. Investigator on current NHMRC and MRFF grant conducting research on physical activity. Chair and lead investigator on Australian physical activity clinical practice guideline for people with moderate to severe traumatic brain injury- funded through MRFF TBI Mission.
Lindsey Reece	Affiliate research contract University of Sydney (Australia) Affiliate research contract Sheffield Hallam University Board (Advisory) member Think Active Global board (research) park run Special Interest Group social value sport (WHO project) Guest Editors Frontiers Associate Editor BJSM NHMRC Partnership Grant
Lucy Westerman	• Employed by Australian Chronic Disease Prevention Alliance, which includes advocacy to support promotion of physical activity policy (including through submissions on consultation and position statements). More information can be provided, if necessary, but I don't see this as a conflict of interest. • Employed by University of Melbourne as a lecturer. • Member of Asia Pacific Society for Physical Activity, Public Health Association of Australia and Australian Health Promotion Association.
Matt Cameron	None
Melody Ding	declare employee of the University of Sydney I receive funding from NHMRC, NSW Health and the Ian Potter Foundation for my work on physical activity systems. I am a WHO consultant
Moira Junge	I am the CEO of the Sleep Health Foundation I have an adjunct role at Monash University (Adjunct Clinical Associate Professor)

Consensus panel member	Declaration of Affiliations and Interests Form and Checklist
	I am a member of the Health Advisory Board for healthylife I am on the Steering Committee of the Quality Use of Medicines for Insomnia and Sleep Health (funded by a Commonwealth Health and Aged Care grant)
Monique Francois	No conflict of interest to declare
Nuria Alarcon Lopez	SPG received grants from the Commonwealth Department of Health and Aged Care
Paddy Dempsey	I do not perceive any of my funding sources, or research interests, to conflict with the subject/tasks required by the Australian Physical Activity Guideline Development Group, but have declared some key interests below to be fully transparent. - Main employment and research funds as PI or AI - Deakin , Leicester, and Cambridge University (partial salaries) - National Health and Research Council (NHMRC) of Australia; research fellowship - Engineering and Physical Sciences Research Council (EPSRC), UK; project grants - Diabetes AU/UK; project grants - NIHR; project grants and Biomedical Research Centre (BRC) Infrastructure Grants - Travel support to consult on WHO physical activity and sedentary behaviour guideline committee (2018-2020) - WHO consultant - Invited travel support to present on physical activity, sedentary behaviour and health at conferences – i.e., American Diabetes Association (ADA), American College of Sports Medicine (ACSM), Royal College of Pathologists of Australasia, Australian & New Zealand Obesity Society, Latin American Congress of Physical Activity & Health Research (CLIAFS).
Paul Gardiner	I have received funding from governments, universities and non-government organisations. I have published peer-reviewed publications related to associations of sedentary behaviour, sleep and physical activity with various health outcomes in adults and older adults. I have not received any funding from industry in recent years.
Peta Lucas	None
Peter Cistulli	Nil COIs directly related to this guideline project. However, as a clinician-researcher in the Obstructive Sleep Apnoea field, he has an appointment to an endowed academic Chair at the University of Sydney that was established from ResMed funding; has received research support from ResMed and SomnoMed; is a consultant to ResMed, SomnoMed, Signifier Medical Technologies, Bayer and Sunrise Medical.

Consensus panel member	Declaration of Affiliations and Interests Form and Checklist
Phil Hamdorf	None
Rae Anderson	None
Raymond John Kelly	- I am the owner of Ray Kelly Fitness Pty Ltd which provides consultative services to Aboriginal medical services - I am a researcher at the University of Melbourne School of Medicine, primarily investigating the impact of lifestyle on Aboriginal and Torres Strait Islander people with type 2 diabetes. - I have recently been awarded an MRFF grant - Author of the section titled 'Physical Activity', in the updated 'National guide to a preventive health assessment for Aboriginal and Torres Strait Islander people', released in early 2024.
Rebekah Harrison	None
Robert Ross	I am the Principal Investigator of a Canadian Institutes of Health Research (CIHR) randomized trial the primary objective of which is to determine the individual variability in response to exercise consistent with current guidelines.
Rochelle Davis	No conflicts of interest to declare
Rona Macniven	Investigator in studies of physical activity interventions in adults and older adults funded by the Macular Disease Foundation Australia, NSW Health and the Heart Foundation.
Ros Knox	None
Sam Bolton	Employee of AusCycling, national sporting organisation for cycling Chair of 4Five+ Athlete Collective cycling club Commissaire for AusCycling
Stuart Biddle	Relevant grants: AU$1,367,212 from National Health & Medical Research Council (NHMRC), 2018-2023 [APP1139974]. Office-based Program to Improve Metabolic control in Sedentary Employees with type 2 diabetes: The 'OPTIMISE Your Health' study. CI-A: Prof David Dunstan (Baker Institute), CI-D: Stuart Biddle. £2,386,941 from National Institute for Health Research, 2019-2023 [RP-PG-0618-20008]. 'Snacktivity' to promote physical activity and reduce future risk of disease in the population. PI ('CI-A'): Prof Amanda Daley (Loughborough University); International collaborator: Stuart Biddle

Consensus panel member	Declaration of Affiliations and Interests Form and Checklist
	Euro 298,759 (allocated initial funding of Eu135,000 for Yr 1), Finland Ministry of Education, Sport, and Culture, 2022-2025. A collaborative theory-based intervention to promote physical activity among sedentary parents and their children (ProAct). PI 'CI-A'): Prof Martin Hagger (University of Jyvaskyla, Finland). Collaborator: Stuart Biddle Sources of income: Book royalties: Biddle, S.J.H., Mutrie, N., Gorely, T., & Faulkner, G. (2021). Psychology of physical activity: Determinants, well-being, and interventions (4th Edition). London: Routledge. Smith, A. L., & Biddle, S. J. H. (Eds.). (2008). *Youth physical activity and sedentary behavior: Challenges and solutions*. Champaign, IL: Human Kinetics. Previous contributions: Member, Guidelines Development Group, International Guidelines for Physical Activity and Sedentary Behaviour, World Health Organisation, 2018-2020
Tony Okely	Chair of Guideline Development Committee for Australian 24-hour movement guidelines for the Early Years and for Children and Young People
Trevor Shilton	Consultant, World Health Organization, Health Promotion Branch, Physical Activity Team Director and Board Member, Asia Pacific Society for Physical Activity (ASPA) Board Member and Chair of the Advocacy Committee, World Heart Federation (WHF)
Yu Sun BIN	No COI for this guidelines project. Employed as senior lecturer by University of Sydney Investigator on current ARC Linkage Grant where the industry partner is Qantas Airways Investigator on previous project and education grants about sleep Member, Australasian Sleep Association Member, Sleep Research Society Member, Australasian Epidemiological Association Member, Public Health Association of Australia Associate Editor, Sleep Health Editorial Board, Sleep Advances Editorial Board, Journal of Activity, Sedentary, and Sleep Behaviours

Consensus panel member	Declaration of Affiliations and Interests Form and Checklist
Zachary Munn	Board trustee of the Guidelines International Network Member of the GRADE Working Group and Centre Director Funded by groups for systematic review and guideline development, although this funding comes from non-governmental organisations, charities, not-for-profits, etc and not from industry. I served as a methodologist on a related guideline – physical activity for TBI

Annex 5: Existing International Physical Activity Guidelines for Adults and Older Adults

Criteria	Pacific Islands (2023)	Norway (2022)	Singapore (2022)	China (2021)	New Zealand (2020)	Saudi (2020)	Canada (2020)	WHO (2020)	UK (2019)	USA (2018)	Netherlands (2017)	Germany (2016)	Australia (2013)
Followed GRADE process	NR	N	NR	NR	NR	Y	Y	Y	Y	N	N	N	Y
Addresses clear questions (can identify PICO elements)	NR	NR	NR	NR	NR	Y	Y	Y	N	Y	N	N	N
Has benefits and harms assessments	NR	NR	NR	NR	NR	N	Y	Y	N	N	N	Y	Y
Assessed using AGREE	NR	NR	NR	NR	NR	Y	Y	NR	N	N	N	Y	N
Allows for updating	N	N	N	N	N	N	Y	Y	N	Y	Y	Y	N
Has existing and accessible evidence tables/summaries	NR	NR	NR	NR	NR	NR	Y	Y	N	Y	Y	N	Y
Has risk of bias assessment	NR	NR	NR	NR	NR	N	Y	Y	N	Y	N	Y	N

Criteria	Pacific Islands (2023)	Norway (2022)	Singapore (2022)	China (2021)	New Zealand (2020)	Saudi (2020)	Canada (2020)	WHO (2020)	UK (2019)	USA (2018)	Netherlands (2017)	Germany (2016)	Australia (2013)
Were integrated (24hr)	N	N	N	N	N	Y	Y	N	N	N	N	N	N
Costs associated with implementing guideline	NR	NR	NR	NR	NR	N	Y	Y	N	N	N	Y	N
Accompanying – how they are going to implement / disseminate the guidelines	N	NR	NR	N	NR	N	Y	Y	Y	Y	Y	NR	Y

Reference: 1. GRADE-ADOLOPMENT (Schünemann et al., J Clin Epidemiol. 2017)

Key: Y=yes; N=no; NR=Not reported/unsure

Annex 6: Participant list of the World Café

Organisation/group	Representative	Role
Department of Health Tasmania	Rebekah Harrison	
NT Health	Kate Robertson	*online participant
Health and Wellbeing Queensland	Kristen Clark	
Department of Health, Victorian Government	Jane Potter	*online participant
Victorian Health Promotion Foundation (VicHealth)	Matt Cameron	
Western Australian Department of Health	Elaine Marshall	
Preventive and Population Health, ACT Health	Ros Knox	
NSW Ministry of Health, Centre for Population Health, NSW	Peta Lucas	
Preventive Health SA	Gabrielle Fisher	
Australia and New Zealand falls prevention society	Jasmine Menant	
First Nations representative	Dr Kate Armstrong	
the Social Policy Group	Nuria Alarcón Lopez	
Australian Sporting Alliance for people with a Disability	Dr Phil Hamdorf	
Disability Sports Australia	Rae Anderson	
Australasian Sleep Association	Dr Deborah Inman	
Public Health Association of Australia	Dr Paul Gardiner	
Australian Chronic Disease Prevention Alliance (ACDPA)	Lucy Westerman	*online participant
Asia-Pacific Society for Physical Activity	Prof. Corneel Vandelanotte	
Allied Health Professionals Australia / Exercise and Sports Science Australia (ESSA)	Judy Powell	

Organisation/group	Representative	Role
Sport Australia	Dr Lindsey Reece	
Cycling and walking Australia and New Zealand	Sam Bolton	
Australian Physiotherapy Association	Prof. Carol Maher	
Australian Bureau of Statistics	Elise Kennedy	*online participant
Heart Foundation / Leadership group	Elizabeth Calleja	
Leadership group - Chair	Tony Okely	facilitator
Leadership group - Co Chair	Monique Francois	facilitator
Leadership group	Trevor Shilton	facilitator
Leadership group - Project Manager	Rochelle Davis	facilitator (online)
Leadership group	Adrian Bauman	
Leadership group	Anne Tiedemann	
Leadership group	Cathie Sherrington	
Leadership group - DHDA Rep	Claire White	
Leadership group	Dylan Cliff	
Leadership group	Kar Hau Chong	
Leadership group	Leanne Hassett	
Leadership group	Melody Ding	
Leadership group	Paddy Dempsey	
Leadership group	Peter Cistulli	
Leadership group	Ray Kelly	
Leadership group	Robert Ross	
Leadership group	Rona McNiven	
Leadership group	Stuart Biddle	
Leadership group	Yu Sun Bin	
Leadership group	Zachary Munn	

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