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# The recommended amount of physical activity, sedentary behavior, and sleep duration for healthy Saudis: A joint consensus statement of the Saudi Public Health Authority

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#### Abstract:

**BACKGROUND:** The goal of the 24-h Movement Practice Guidelines for Saudi Arabia is to provide policymakers, health-care providers, researchers, sports professionals, and members of the public with recommendations on the duration of time they should spend engaged in physical activity, sedentary behavior, and sleep throughout all age groups.

**METHODS:** A modified RAND appropriateness method and the “GRADE-ADOLPMENT” approach of guideline recommendations were used by a guideline development panel to develop the present recommendations.

**RESULTS:** The recommendations were based on the integrated needs of the following age groups: children (0–2 years), preschoolers (3–5 years), children and adolescents (6–17 years), adults (18–64 years), and older adults (≥65 years). The guidelines also include special considerations for sleep duration in the Saudi culture, such as dawn prayer and Ramadan.

**CONCLUSIONS:** Several research gaps in physical activity, sedentary behavior, and sleep were identified and highlighted by the guideline development panel for potential future research.

#### Keywords:

Adult, infant, physical activity, preschooler, public health recommendation, sedentary behavior, sleep, toddler

Recently, Saudi Arabia has experienced rapid cultural, political, economic, and developmental changes with a gradual shift from rural to urban living in the past three decades,<sup>[1]</sup> leading to a marked change in the lifestyle of people, including less physical activity, increased sedentary behavior, and reduced nocturnal sleep duration.<sup>[2-12]</sup>

Thus, the absence of national guidelines that focus simultaneously on physical

activity, sedentary behavior, and sleep duration, incorporating cultural differences, has prompted the need to develop the 24-h movement practice guidelines for Saudi Arabia.

## Methods

A panel of seven members of various specialties, including physical activity specialists, nutrition and diet specialists, sleep medicine, epidemiologists, and

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guideline-development methodologists, used a modified RAND appropriateness method originally developed at RAND and the University of California–Los Angeles School of Medicine<sup>[13]</sup> to develop recommendations regarding the optimal time to spend on the three-movement behaviors: Physical activity, sedentary behavior, and sleep. In addition, two interdependent groups were involved in the development process: a core panel, involved in the prioritization of questions related to the topics of the guidelines (physical activity, sedentary behavior, and sleep duration), and an expert panel, focused on using the evidence and data provided by the core panel to reach a consensus for each of these topics.

The “GRADE-ADOLOPMENT” approach of guideline recommendations, which combines the advantages of adaptation, adoption, and *de novo* guideline development, was applied to develop the guidelines.<sup>[14]</sup> Significant questions on physical activity duration, intensity, frequency, and type; sedentary behavior durations, patterns (frequency, interruptions), and type; and the sleep duration needed for optimal health in healthy people of different age groups were formulated. The core panel reviewed the best, most recently published practice guidelines that addressed the significant questions from January 2015 to April 2020 and evaluated results using the Appraisal of Guidelines for Research and Evaluation II tool.<sup>[15]</sup> Guidelines that addressed the questions and attained the highest quality scores were selected for the adaptation process. As per the RAND Appropriateness Method, two rounds of the evidence review, discussion, and voting were performed to reach the final recommendation over a period of 12 months.

For physical activity, the Panel adopted the UK Chief Medical Officers’ Physical Activity Guidelines and supplemented them with Canadian and US Practice Guidelines to cover all age groups when needed.<sup>[16-24]</sup> For sedentary behavior, the committee adopted the Australian 24-h Movement Guidelines for the Early Years (birth to 5 years), Australian 24-h Movement Guidelines for Children (5–12 years) and Young People (13–17 years), and UK Chief Medical Officers’ Physical Activity Guidelines, as these guidelines met the criteria set by the panel.<sup>[25-27]</sup> For sleep duration, the panel used nine health categories and subcategories adopted by the American Academy of Sleep Medicine<sup>[28-30]</sup> in rounds one and two votings. The expert panel developed the recommendations after completing two rounds of voting. Finally, the final recommendations were submitted to the Saudi Public Health Authority.

The details of the background literature, methodology, and modified RAND Appropriateness Method will be published in an accompanying article.

## Recommendations

The recommendations were based on the integrated needs of each age group. Users of the guidelines would need to adjust the recommendations for mixed ability groups such as disadvantaged and those with preexisting conditions or those undergoing treatment, impacting the ability to undertake the recommendations. It is recommended that a model that supports a gradual increase in activities and improved sleep is adopted to achieve optimal recommendations.

### Children (0–2 years)

#### Physical activity

Infants (<1 year old):

- Infants should be physically active several times daily in a variety of ways, including supervised interactive floor-based activity; the more is better
- For infants not yet mobile, a minimum of 30 min of tummy time spread throughout the day while awake (and other movements such as reaching and grabbing, pushing and pulling themselves independently, or rolling over); the more the activities, the better (conditional)
- Examples include rolling, crawling, tummy time, reaching or grabbing for objects, toys, pushing, and pulling themselves independently.

Toddlers (1–2 years):

- Toddlers should spend a minimum of 3 h (180 min) per day in a variety of physical activities at any intensity, including energetic and outdoor play spread throughout the day; the more the activities, the better (conditional)
- Examples: Walking, running, claiming, pulling, pushing, ball games, activities in the park (riding a tricycle or bike), water activities, and tagging play.

#### Sedentary behavior

Infants (0–1 year):

- Not restrained during waking hours for more than 1 h at a time (in a stroller, car seat, or high chair)
- Be encouraged to engage in activities such as reading and storytelling with a caregiver when sedentary
- Screen time is not recommended.

Toddlers (1–2 years):

- Not restrained for more than 1 h at a time (in a stroller, car seat, or high chair) or sitting for extended periods
- Be encouraged to engage in activities such as reading and storytelling with a caregiver when sedentary
- For toddlers (1–2 years), sedentary screen time is not recommended
- For toddlers (2–3 years), sedentary screen time should be no more than 1 h throughout the day; the shorter the time, the better.

### Sleep duration

Newborns (0–3 months):

- For optimal health, in newborns (0–3 months), 14–17 h of good-quality sleep per 24 h (for the first 28 days, newborns may sleep for up to 20 h) is recommended (including daytime sleep) (strong).

Infants (4–11 months):

- For optimal health, in infants (4–11 months), 12–16 h of good-quality sleep per 24 h is recommended (including daytime sleep) (strong).

Children (1–2 years):

- For optimal health, in children (1–2 years), 11–14 h of good-quality sleep per 24 h is recommended (including naps) (strong).

### Preschoolers (3–5 years)

#### Physical activity

- Preschoolers should spend a minimum of 3 h (180 min) daily in a variety of physical activities, with a minimum of 1 h (60 min) of energetic and outdoor play, spread throughout the day (conditional)
- They should accumulate 1 h (60 min) or more of moderate-to-vigorous aerobic physical activity per day, which is appropriate for their ages (conditional)
- Examples: Playing organized and free games, running, climbing, pulling, pushing, ball games, Examples activities in the park (riding a tricycle or bike), water activities, and tagging play.

#### Sedentary behavior

- Not restrained for more than 1 h at a time (in a stroller, car seat, or high chair)
- Be encouraged to engage in activities such as reading, storytelling, or coloring with a caregiver when sedentary
- Sedentary screen time should be no more than 1 h throughout the day; the shorter the time, the better.

#### Sleep duration

- For optimal health, in children (3–5 years), 10–13 h of good-quality sleep per 24 h is recommended (which may include naps), with consistent bedtimes and wake-up times (strong).

### Children and adolescents (6–17 years)

#### Physical activity

- Children and adolescents (6–17 years) should engage in a minimum of 1 h (60 min) of moderate-to-vigorous physical activity per day, with most duration as aerobic physical activity (strong)
- They should engage in vigorous physical activity, including muscle and bone-strengthening physical activity, a minimum of 3 days per week as part of their 1 h (60 min) or more per day (strong)

- They should perform several hours of a variety of light physical activities per day (conditional)
- Examples: Moderate activities such as brisk walking, housework, recreational swimming, and free physical play
- Vigorous activities such as running and playing games (football, volleyball, and tennis).

#### Sedentary behavior

- Should limit sedentary recreational screen time to no more than 2 h throughout the day
- Break up long periods of sitting as often as possible.

#### Sleep duration

Children (6–12 years):

- For optimal health, in children (6–12 years), 9–12 h of good sleep per 24 h is recommended, with consistent bedtimes and wake-up times (strong).

Adolescents (13–17 years):

- For optimal health, in adolescents (13–18 years), 8–10 h of good sleep per 24 h is recommended, with consistent bedtimes and wake-up times.

#### Daytime nap

- For optimal health, school-aged children ( $\geq 6$  years) and adolescents should get all the recommended sleep during nighttime (conditional).

### Important considerations for sleep duration in children

There are a few important considerations that should be explained to complement the recommendations for sleep duration in children.

- Sleeping the recommended duration with consistent bedtimes and wake-up times is associated with better health outcomes, including improved attention, behavior, learning, memory, emotional regulation, quality of life, and mental and physical health
- Sleeping less than the recommended duration regularly is associated with attention, behavior, and learning difficulties
- Insufficient sleep enhances the risk of accidents, injuries, hypertension, obesity, diabetes, and depression
- Insufficient sleep in adolescents is linked to an increased risk of self-harm, suicidal thoughts, and suicide attempts
- Sleeping more than the recommended duration regularly may be associated with harmful health outcomes such as hypertension, diabetes, obesity, and mental health problems
- Parents who are worried about the quality of sleep, sleep duration, or sleep pattern of their child should consult their family physician or pediatrician.

## Adults (18–64 years)

### Physical activity

- Adults should perform a minimum of 2 h and 30 min (150 min) to 5 h (300 min) per week of moderate-intensity physical activity, or 1 h and 15 min (75 min) to 2 h and 30 min (150 min) per week of vigorous-intensity aerobic physical activity, or an equivalent combination of moderate and vigorous-intensity aerobic physical activity. Preferably, aerobic activity should spread throughout the week (strong)
- For more substantial muscle and bone health, adults should engage in strengthening activities using major muscle groups for a minimum of 2 days per week (strong)
- For good physical and mental health, adults should engage in light physical activity and sit less throughout the day (strong)
- Examples include moderate activities such as brisk walking, gardening, recreational swimming, and free physical play and vigorous activities such as jogging, running, and playing games (football, volleyball, and tennis).

### Sedentary behavior

- Reduce the amount of time spent in prolonged sitting throughout the day
- Break up long periods of sitting as often as possible with a minimum of light physical activity.

### Sleep duration

- For optimal health, in adults,  $\geq 7$  h of good sleep per night is recommended, with consistent bedtimes and wake-up times (strong)
- For optimal health, in young adults (18–25 years), 7–9 h of good sleep per night is recommended, with consistent bedtimes and wake-up time
- For optimal health, in adults (26–64 years), 7–9 h of good sleep per night is recommended, with consistent bedtimes and wake-up times.

## Important considerations for sleep duration in adults

A few important considerations should be explained to complement the recommendations for sleep duration in adults.

- Regularly sleeping  $< 7$  h per night is associated with harmful health outcomes, including weight gain and obesity, diabetes, hypertension, heart disease, stroke, depression, and increased risk of death
- Sleeping  $< 7$  h per night is also associated with impaired immune function, increased pain, impaired performance, increased errors, and a greater risk of accidents
- Sleeping  $< 7$  h per night but getting a long daytime nap (splitting sleep between day and night “Biphasic

sleep”) to maintain the same sleep duration may mitigate the short-term harmful effects associated with shorter nocturnal sleep. The long-term effects of this practice are not known

- Regularly sleeping  $> 9$  h per night may be acceptable for young adults, individuals recovering from sleep debt, and individuals with illnesses. For others, longer sleep duration may be associated with undesirable health effects
- Individuals who are worried about their quality of sleep, sleep duration, or sleep pattern should consult their physician (health-care provider).

## Older adults ( $\geq 65$ years)

### Physical activity

- Healthy older adults ( $\geq 65$  years) should engage in a minimum of 2 h and 30 min (150 min) of moderate-intensity physical activity per week, or 1 h and 15 min (75 min) of vigorous-intensity aerobic physical activity per week, or an equivalent combination of moderate-to-vigorous aerobic physical activity, spread throughout the week (strong)
- If they cannot meet the recommended physical activity, then light activity brings some health benefits, while more daily physical activity provides greater health (strong)
- They split the recommended physical activity in bouts throughout the day (strong)
- Older adults should maintain or even improve muscle strength, balance, and flexibility on a minimum of 2 days per week. These could be combined with sessions involving moderate aerobic activity or additional sessions on separate days (strong)
- Older adults with chronic conditions should consult their doctors or health professionals before engaging in the recommended physical activity (strong)
- Older adults who continue to enjoy a lifetime of vigorous physical activity should carry on doing so while considering safety practices (strong)
- Examples: Light activities such as slow walking, housework, gardening, and shopping and moderate activities such as brisk walking, gardening, recreational swimming, tiding housing, and vigorous activities such as jogging, running, and stepping.

### Sedentary behavior

- Reduce the amount of time spent in prolonged sitting throughout the day
- Break up long periods of sitting as often as possible with at least light physical activity, when physically possible, or standing.

### Sleep duration

- For optimal health, in older adults ( $\geq 65$  years), 7–8 h per night is recommended, with consistent bedtimes and wake-up times.



## Special considerations for sleep duration in the Saudi culture

- A. Daytime naps
  - In adults, daytime napping can be practiced (if feasible); nevertheless, for optimal health, it is recommended that napping time should be around mid-day (noon) in those who wake up at dawn or early morning (conditional)
  - In adults, it is recommended to limit daytime nap duration to <30 min.
- B. Dawn prayer and sleep
  - Practicing nocturnal splitting of sleep owing to the Fajr (dawn) prayer showed no evidence of harmful health effects (conditional).
- C. Ramadan and sleep
  - For optimal health, during Ramadan month, it is suggested to obtain sufficient sleep at night (4–6 h) that needs to be supplemented with daytime sleep of 1.5–2 h and to avoid disturbing the circadian rhythm and sleep, it is also recommended to limit food intake to two main meals at night (plus a snack if needed): one around sunset and the other in the predawn time (conditional).

## Areas for future research

### Physical activity

The physical activity guidelines development panel identified several research gaps; for example, physical activity guidelines need to be developed based on Saudi sample population cohort studies with robust methodology in healthy individuals and in those with various health conditions (cardiovascular disease, diabetes, metabolic syndrome, obesity, and cancer) to establish national physical activity prevalence and identify risk factors associated with the physical inactivity behavior. In addition, accurate and reliable assessment tools for physical activity should be established to provide more precise data comparisons and inferences between studies. Furthermore, cultural context studies of physical activity are required as gaps in this field should be filled with clear, comprehensive answers.

Areas for more high-quality studies:

- Identify the recent physical activity trends in Saudi Arabia, especially during the recent evolution of Saudi Vision 2030
- Apply the most recently recommended methodology for assessing physical activity, including the use of objective measurements
- Examine the health benefits of physical activity components (types, intensity, duration, and weekly frequency) for each age group
- Assess the physical activity level, where possible, in all Saudi regions, including the non-Saudi sample population

- Develop the key factors that enable dissemination, adaptation, activation, implementation, and uptake of physical activity guidelines.

### Sedentary behavior

The guideline development panel identified several research gaps during the development of these guidelines. The areas for high-quality studies include the following:

- Establish standardized procedures and objective measurement of sedentary behavior to enable comparison between studies
- Use direct objective measures of sitting (thigh-mounted activity monitors)
- Compare the health impact of passive versus active sedentary behavior
- Investigate the effect of sedentary behavior on health in different populations (pregnant women, after childbirth, people with cardiovascular diseases, and people with neurological diseases)
- Establish the cost-effectiveness of sedentary behavior targeted intervention and promotion
- Examine the key factors that enable dissemination, adaptation, activation, implementation, and uptake of guidelines.

### Sleep duration

The panel indicated the following areas that require further future research:

- Patterns of napping in children in Saudi culture and their long-term health effects
- More research is needed to assess the best time of daytime napping and its relation to the bedtime and rise time of the individuals
- More research is needed concerning the long-term effects of splitting the total sleep duration per 24 h between day and night
- Further studies on the effects of splitting sleep owing to Fajr prayer on neurobehavioral performance, cognitive function, and long-term health outcomes are needed
- More research is needed to determine the optimal sleep pattern during Ramadan, which promotes good health outcomes
- More research is needed to assess sleep patterns in older adults and their health impact.

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## Conflicts of interest

There are no conflicts of interest.

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